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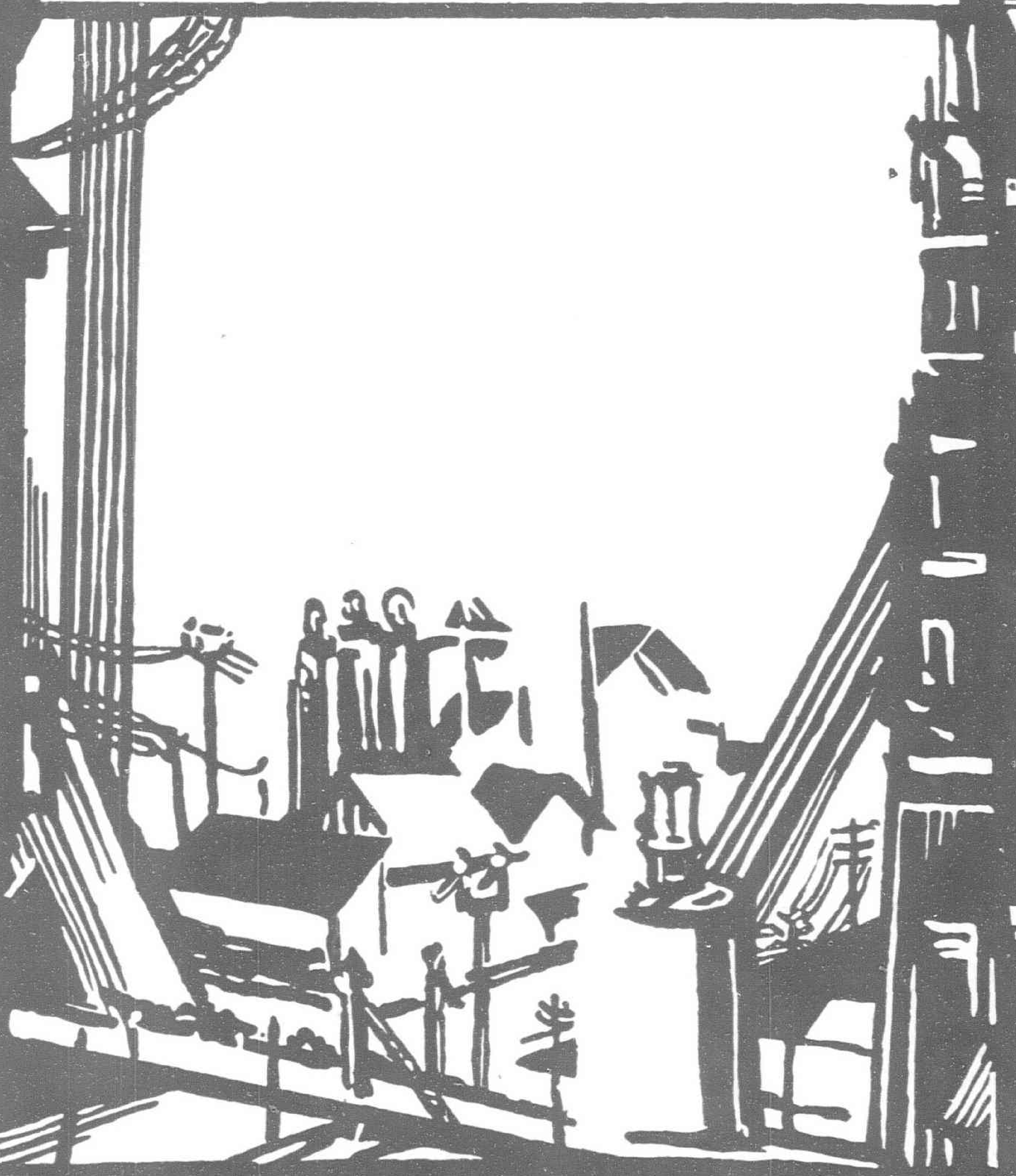

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AMERICAN PEACE AIMS MAY BRING WAR

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A NEW ASPECT OF MANCHOUKUO

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American Peace Aims May Bring War

By *EDWIN M. BORCHARD, Professor of International Law at Yale University in Current History*

General fear of another great war has been awakened by the gradual disintegration of the Disarmament Conference, called ostensibly to redeem the vague pledge of the covenant of the League of Nations substantially to reduce European armaments. The fear is not unjustified. The cause lies partly in armaments and the hypocrisy of the conference ; but it lies mainly in the political conditions created by and nurtured under the unwise treaties which closed the World War. It lies also in the collapse of the hopeful structure, founded on ambiguous phrases, which was erected in 1919 to preserve the *status quo* achieved at Versailles.

Two groups, inspired by divergent motives, were responsible for the creation of that structure : (1) Those who desired to preserve by military force the territorial and economic outcome of the war ; (2) those who desired, by co-operation and, if necessary, by sanctions, to prevent the outbreak of a new war. The " idealism " aroused by the second group was abducted by the first, to serve its purpose. Thus the desire to maintain the *status quo* was identified with peaceful proclivities, whereas the desire to change it was identified with warlike intentions. It was provided that if any nation resorted to " war " to solve its difficulties (except to enforce the peace treaties), the others would convene to denounce it as an " aggressor " and take joint action to bring it to heel. Peace as an ideal and the *status quo* as a fact were indissolubly welded.

It ought to be evident that such a program was quite inconsistent with any plan to limit armaments. The status created was one of war, made by war and sustainable only by force and a threat of further war. It did not correspond to natural conditions. For a time the rapprochement between Briand and Stresemann raised hopes that the political disease would be treated at its source. But Briand's successors were not so minded, and preferred to rely upon military alliances, the sanctions of the League against " aggressors," and a permanent military superiority. M. Daladier, one of the more reasonable of the French statesmen and not an advocate of the " preventive war," in a recent speech is reported to have asserted that the " French military superiority over Germany must be guaranteed by all the signatories of (any disarmament) pact " that may be signed.

By saddling the League of Nations with the sanctions of Articles 10 and 16 of the covenant the greatest disservice is done to the League, which has many useful functions to perform, and to the cause of peace itself. The various results of this may be set out as follows :

Foundation of Peace

(1) A refusal to consider seriously the necessity of reconciliation as the indispensable foundation to peace, for when united force will sustain the *status quo*, amicable relations seem less important ; we have had a specious truce, but no peace.

(2) The mind of the world has remained fixed on force and war, for sanctions among the nations still relatively independent do not awaken pacific reflections.

(3) There has been a huge growth of armaments, for, as Stanley Baldwin said on May 18, " there is no such thing as a workable sanction which does not mean war. If we adopt sanctions we must prepare for war."

(4) Although it sounds simple to pick an " aggressor," this a matter on which historical opinions after years of research frequently disagree, let alone governments and peoples, moved by the excitement and self-interest of the moment when required to make an immediate decision. The very fear that united force may operate against a single nation will afford a powerful incentive against any disarmament, for every country will feel itself obliged to prepare to meet the simultaneous opposition of many nations. It will be a new incentive to alliances. No nation can tell when its political position will arouse enmities which expose it to denunciation as an " aggressor." Moreover, the conception of " aggressor " in a dynamic, unsettled and everchanging world seems essentially puerile as a criterion of practical administration, for it ignores the underlying facts which condition international relations, although there is no reason to deprecate non-aggression or other pacts between neighboring countries which will relieve tensions and stresses. It is interesting to note that the Pan-American non-aggression pact strictly prohibits " intervention either diplomatic or armed " by the " neutrals."

Possibility of Sanctions

(5) The very possibility of sanctions, even economic, offers a profound stimulus to autarchy, or national self-sufficiency, and nationalism, for one must be prepared to live alone against a boycott ; thus, the policy is directly opposed to the free exchange of goods.

(6) Sanctions are an incentive to imperialism and the control of other countries, for national self-preservation is made more precarious by the threat of united opposition ; thus, a boycott against Japan would have done more than anything else to impel her to capture the resources of China, and so fight off a hostile world.

(7) The peace treaties have perpetuated the blood feud in Europe, for they tend to produce a permament classification of " good " and " bad " nations, with the " good " nations in control of affairs and the " bad " in a permanent state of revolt against what they consider a conspiracy of injustice. This, in the case of Germany, has already produced a neurosis which has put a once constructive people into the hands of psychopatic provincials who symbolize for the world a tragic result of the international mismanagement of Europe.

(8) The peace treaties have been ruinous to the psychology of equality, liberalism, fraternity and emancipation, for they intensify the primitive passions of men to maintain supremacy over others as an alternative to subjection, and thus make for war.

Policy of Stimson

No wonder Henry L. Stimson could remark in his lecture at Princeton on April 9 that the hopes of the world formulated in 1919 had " turned to ashes." What other result could have been expected from a scheme that had no roots whatever in history or human experience but flew directly in the face of elementary psychology, economic principles, and the hard political facts of Versailles ? It seems a pity that the emotions of so many good people, among the best we have, should have been enlisted in support of schemes that had no chance of success and that perpetuated the very evils they hoped to eradicate.

This preliminary survey of the effects of the past fifteen years of misguided and thinly veiled hostilities is necessary to a discussion of the efforts to drag the United States into responsibility for the maintenance of the system set up at Versailles. For sheer persistence, the campaign is worthy of admiration ; but for unequivocal danger to the United States, nothing can equal it.

Those efforts are not new. The Allied governments in 1917, after an immense propaganda, the like of which had never been seen before, finally succeeded in dragging the United States into a European war it did not understand. The American people had, by the very confusion of voices and daily subjection to fanciful pictures of the peace-loving belligerents of the one side and the war-loving belligerents on the other, lost that alertness to the purposes of European diplomacy which characterized the early statesmen of this country. Herbert Agar, a well-informed American student of the subject, remarked in the *Nineteenth Century* (London) for January, 1933, that " during the war astonishing efficient British propaganda service convinced the Americans of some of the most bizarre fairy tales which ever have been devised. To this day most of the population has not recovered from the alleged information which it then 'swallowed whole.' " Sir Gilbert Parker (*Harper's*, March, 1918) mentions the army of British propagandists who worked on the American people for two and a half years and saw those people " strip themselves of......the dangerous and insidious security of peace."

There is no occasion for resentment against the propagandists or those who paid them ; when a gullible people are taken in, they have only themselves to blame. Naturally, the propaganda was immensely aided by the ineptitude, if not stupidity, of the Central Powers, by the financial interests that began to be identified with Allied success, and by the unneutrality that began to permeate the Wilson administration.

Role as Neutral

When, in February, 1916, the United States Government began to become officially unneutral, as shown by the tentative promise of Colonel E. M. House that if the Germans did not accept certain Allied terms the United States would join the Allies—a committal only slightly relieved by President Wilson's interpolation of the word " probably "—the influence of the United States as an impartial mediator waned and the opportunity to secure a recognition of the time-honored rules of international law and the high privilege and vital necessity of remaining neutral in the European struggle rapidly vanished.

Although President Wilson desired, as I shall always believe, to keep the American people out of war, he undertook and sanctioned acts which made such an outcome all but impossible. Secretary Bryan realized the direction affairs were taking as early as 1915, when he resigned. Nor was President Wilson well served by his Ambassadors, who helped to undo him. But when the unneutrality had its natural result, President Wilson, finding it necessary to clothe the enterprise in words of high endeavor, infused the Allied cause with the inspiration of a holy crusade.

The sorry end of the adventure for democracy and for peace was predictable. The Allies quite naturally were fighting for the secret treaties, whereas the United States thought it was fighting for the Fourteen Points and democracy ; but no agreement had been reached as to which would prevail. The result is all too well known. When the United States had spent its $50,000,000,000 and its lives and well-being on the foreign war, the European belligerents relieved the United States of all important responsibility for the writing of the treaties. The League covenant was a concession to the United States, which some of the Allies at first resented but then appropriated to their purposes, although, if purged of its war-making clauses, it possibly might yet redeem some of the hopes of those who supported it as an instrument of peace. The " freedom of the seas," the Second Point and the ostensible legal ground for American intervention, was scotched by the British Government before the Peace Conference opened.

Wilson's Policy

That defeat gave rise to President Wilson's unfounded and rationalized discovery that " neutrality is a thing of the past," for under the theory of the scheme of sanctions, whenever any nation goes to war all the world must go to war ; hence there is no longer any place for neutrality. If that were true, small nations would gradually be wiped out. But the theory has produced among the devotees of sanctions widespread opposition to the rules of international law, so that the new scheme for the regeneration of the world is rooted in essential lawlessness—hardly a promising way out of " anarchy."

The United States Senate did not refuse to ratify the Treaty of Versailles because of its harshness but because of the commitments of Articles 10 and 16, which, if put into operation, do mean war. Fortunately, they have not been put into effect, although their spirit has permeated most of the " peace " plans ; for Europe has never relented in its efforts to draw the United States into a guarantee of the *status quo*.

After the repudiation of President Wilson's promise in association with Great Britain to guarantee France, the effort to inveigle the United States into armed support of the " peace-loving " nations of Europe took other forms—all calculated to break down American neutrality toward European belligerents and to help overwhelm the declared " aggressor."

Hope of American armed intervention having been ostensibly abandoned, a steady propaganda was then begun to draw the United States into commitments not to trade with the " aggressor." It was argued that the " peace-loving" nations were disabled from enforcing peace, because they could not boycott an " aggressor" successfully if the United States would not stop trading with him. In numerous quarters in the United States this explanation was accepted as evidence of peaceful intentions and as a ground for attacking the United States as an obstruction to the world's peace.

Case for Intervention

The case for intervention has undergone various changes, but not for the better. At first it was proposed that American commitment be conditional upon the unanimous agreement of the members of the League as to the nation guilty of " aggression," but the later versions of the plan, advanced by Norman H. Davis at Geneva, make unanimity or even the League no longer a requisite, but only the agreement of " the States in conference." How many " States in conference " are required, deponent saith not, but possibly the " peace-loving" nations will suffice. Thus, we promise an *open alliance*. It is to the credit of President Coolidge that he never succumbed to these blandishments. But since the Kellogg pact of 1928 the campaign for American intervention in Europe has been renewed with augmented vigor.

This was brought about partly by the Kellogg pact itself and partly through other influences. The original French purpose to secure an American alliance, although turned by Secretary Kellogg into a multilateral agreement, was so reframed by its European architects as to renounce all wars of offense, but to legalize all wars of defense and certain other wars that the late belligerents might feel obliged to fight in various parts of the world. Each belligerent was to determine for himself whether his war was " defensive." Only certain supposititious, but no actual, wars were thus outlawed.

Yet inasmuch as the " co-operating" machinery remained largely in the hands of the " peace-loving " nations, they would naturally have a preponderant voice in determining who was the " aggressor." Against him, the peace-lovers would struggle under the Covenant of the League, whereas the United States would struggle against him under the Kellogg pact. This was the practical outcome of the great scheme for the reform of the world, as honest Briand openly admitted. The United States had been drawn into the commitments of the League of Nations ; the other countries had signed nothing to which they were not already committed.

Then began the campaign to put " teeth " in the pact, induced by the psychology of "sanctions" to "enforce " peace. Although Mr. Kellogg avowed that the pact was to be only a declaration of policy, a self-denying ordinance, this did not satisfy the more ardent believers in " sanctions." But with the gradual recession of the " Locarno spirit" in Europe, the American people manifested a growing indisposition to " bite " ; so that for the " teeth" there was substituted a preliminary " consultative pact," proposed in Europe and first officially endorsed by Secretary Stimson at the London Naval Conference of 1930, and then tacked on the disarmament plans at Geneva. We were to " consult" with the principal powers to determine what action was to be taken when any country breached the peace or the disarmament pact. It was assumed by some that this was an innocuous commitment, calculated to satisfy the demands of American peace-lovers who considered that the United States was lagging behind the late European belligerents in its sacrifices for peace. So plausible did the "consultative pact" sound that both political parties endorsed it.

An Appeal to Reason

But as John Bassett Moore has convincingly shown in "An Appeal to Reason," in *Foreign Affairs* for July, 1933 a "consultative pact" must be understood in the light of its environment and subject-matter. When the United States "consults" with the controllers of Europe as to how to maintain the "peace" and to agree on what should be done respecting threatened or actual breach of peace—"to determine which party or parties to the dispute are to be held responsible"—it is not a platonic engagement which is contemplated, but action, definite and decisive. The fact that this did not instantly occur to the American people is a cause for alarm.

It was a "consultative pact" of 1904, then called an "Entente," which tied Great Britain to the chariot wheels of French policy in 1914. The new term had simply not then come into fashion.

The "consultative pact" has continued to exert a certain fascination for those who would commit the United States to the vicissitudes of European politics. Norman H. Davis, as American Ambassador at Large, announced at Geneva in May, 1933, a policy which has recently been re-emphasized, as follows: "We are willing to consult other States in case of a threat to peace with a view to averting a conflict. Further than that, in the event that the States in conference determine that a State has been guilty of a breach of peace in violation of its international obligations and take measures against a violator, then, if we concur in the judgment rendered as to the responsible and guilty party, we will refrain from any action tending to defeat such collective effort which the States may thus make to restore peace."

Under that policy the United States is (1) to consult, (2) to determine, after the "States in conference" have agreed, who is "responsible and guilty" of a breach of the peace, and (3) to refrain from any action tending to defeat such collective effort. As Sir John Simon said on May 18, "nothing can be clearer than that." It is in effect a promise to violate the neutrality of the United States by discriminating against the nation whom the "States in conference" pronounce to be the "violator" of the peace. By such a committal the United States openly invites itself into a foreign war, for the United States cannot be both neutral and unneutral at the same time, or at least for very long. Proponents of the Davis idea apparently entertain the view that there is some twilight zone between neutrality and unneutrality which permits of partiality, that is, unneutrality, without inviting the consequence of unneutrality. But there is no such intermediate status. The assumption that there is involves a fundamental error. It misled the men of 1916. And if "refraining" does not have the desired effect, the disappointment will doubtless be more vigorously expressed.

Qualification by Davis

More recently Mr. Norman Davis, while ostensibly qualifying the commitment, has improved upon the scheme by announcing that the United States, if it determined for itself upon the identity of a violator of the proposed arms pact, would refrain from protecting the trade of its nationals with the "violator." This is just as reprehensible and as legally unsustainable as the wider scheme. The refusal to support our trade with one belligerent is not only a hostile discrimination but entitles the belligerent discriminated against legally and politically to regard us as a declared enemy. Thus, we would begin the proceeding by putting ourselves legally in the wrong. The official boycott, open or disguised, is a hostile and essentially warlike act, not a peaceful measure. No amount of higher motives or peaceful intentions can make it anything else.

A few American newspapers seem disappointed because Ambassador Davis, in his Geneva declaration of May 29, 1934, while reiterating earlier commitments, expressed the unwillingness of the United States to "participate in European political negotiations and settlements" or "use its armed forces for the settlement of any dispute anywhere." They prefer the formula of Soviet Russia, which promises force. But there is no reason for inconsolability. If the Davis commitment of 1933 is adhered to, it will constitute the most effective participation in European political negotiations and will doubtless be duly followed by armed force.

Moreover, the assumption that the United States would retain its independent judgment is likely to prove something of a delusion. When the European belligerents decide as to who is the "aggressor" or "violator," the pressure on the United States to bring about concurrence may again prove irresistible. At all events, the mere opportunity to influence the decision of the United States, under the Davis formula, will transfer the hysteria of the foreign war to American soil and bring our own people into internecine differences. This was not the least of the reasons why the founders of the country warned the American people against ever becoming entangled in European politics. Rarely have European politics been so perversely confused and volcanic as at the present moment.

The taking-of-sides theory was further exemplified in the proposal for a unilateral arms embargo against a "country" which disturbs the peace—an embargo which the President was to impose after consultation with such other governments as he might select. This was a further lurch from the path of legality and wisdom, for the inevitable results of such a policy were not generally perceived. Without even the safeguard of a unanimous decision of the League, which is some guarantee against recklessness, the President of the United States was to be authorized to enter into an alliance with any foreign powers he might select, to impose a hostile discriminatory embargo upon a country which had employed "force." This would have been an unconstitutional abdication of the Senatorial power over treaties, would have vested the war-making power in the President, would have violated many treaties of the United States, was contrary to international law and would have imposed on the President, preoccupied with sufficient domestic difficulties, the "pastime of playing with war," as Judge Moore phrased it.

The particular European source of the proposal and the occasion for its application in the Winter of 1933 are still shrouded in mystery. The fact that on its first presentation it passed the Senate without appreciation of its implications is an indication of the dangers to which the United States is continually exposed. When these dangers were pointed out, the Senate reconsidered its position and, after an unanimous report from the Foreign Relations Committee, unanimously adopted the resolution with a fundamental amendment to the effect that the embargo was not to be applied against a single belligerent, but only against both or all belligerents, so as to safeguard American neutrality. The House has not yet repassed the resolution, as amended. The taking-of-sides theory blocks the way. Perhaps it was a disappointment to some that Great Britain and Geneva were unable to pick the "aggressor" in the Chaco war between Paraguay and Bolivia.

The Hoover Policy

The policy of the Hoover administration toward Japan in the matter of Manchoukuo brought the United States dangerously close to hostilities. Here again it was a mechanistic and moral judgment which seemed to control the policy, for American interests were far less affected than those of certain European powers. Mr. Stimson may have sought to enlist the principal members of the League behind his anti-Japanese initiative, but Great Britain and France were not interested, so that the United States was left alone, with the anonymous League, to bear the brunt of Japanese resentment. Great Britain and France evidently have a sound reason for their position, which it might be well to try to understand before embarking on quixotic courses.

Unfortunately, the advocates of League sanctions and endowed "peace" organizations again do the League a disservice by associating their resentment against Japan with public demands for boycotts and the expression of other hostile sentiments calculated to arouse the world against Japan. For the United States to take part in such an enterprise would be likely to have as impractical a result as our attempt to restore peace to Europe by war. Already in an uncertain financial condition, we might risk unpredictable consequences at home; but even if the enterprise were successful, at best it would probably result in handing Manchuria to the Russians, thus permitting the whole of Asia to be more easily Bolshevized. It would again immolate the United States for the benefit of foreign countries.

Thus, the danger of war to which the United States is exposed is caused not necessarily by militarists, or even by munition makers, unfortunate as their influence may be, but by a philosophy that believes that the United States can aid in preserving the peace of the world by taking sides with some States against others. A powerful and well-financed propaganda supports this policy. It professes to draw sustenance from the threat that if war breaks out in Europe, we should " inevitably " be drawn in; hence we should join the " peace-loving " nations in " enforcing " peace. It is not possible to tell exactly what will be the future effect of our having entered the last European war, contrary to the profoundest American tradition. That it has weakened the fibre of American independence is quite probable. But have we lost control of our destiny? Are we to be permanently helpless before the seduction of foreign propaganda, using the language of peace to draw us into war? Should not the experience of the last war be a warning rather than an example?

The fact is that the hypothesis and program of enforcing peace by collective sanctions, a purely mental conception, has had to disparage the existing international law, the product of centuries, and the usual processes identified with the growth of law. The glib phrase that any one who violates the " world law " must be dealt with as an outlaw, like Dillinger, draws an unfounded analogy between private law and public law, ignoring the sources and processes of both. We have just had some experience with the regeneration of the American people through the prohibition law, a fact which ought to give pause to those who expect Utopia from paper, and would make war to enforce it.

Pre-War Anarchy

It has been assumed that the pre-war world was one of " anarchy " which led to the war, and that therefor a new system must be put in its place. If the pre-war period was " anarchy," then the present might look like super-anarchy. The trouble with the pre-war period was not the system of balance of power, which is the one natural and impregnable social force in all groups of human beings, nor the fact that States were " armed " or " competing," but the fact that the ambitions of certain statesmen outran their disposition to maintain the peace. The struggle for the balance of power is also the mother of civil wars, which, even in rigidly organized States, we have found no means permanently to prevent. How can one expect more from the loosely organized family of nations? It was not the system which caused the débâcle, but the shortsightedness of its managers; and against shortsightedness there is no known antidote other than the awareness of the people and their refusal to be carried to destruction. Even that is not always a guarantee.

If it was the system that was at fault, there is no change in it—except for the worse. Tolerance, good-will, the policy of live and let live, simple human decency—these elementary conditions of peace have suffered immeasurable setbacks. The makers of the Treaty of Vienna of 1815 realized some of these fundamental truths, and resisted the temptation to mutilate France and give her a permanent grievance which would but be a prelude to new wars. Those were statesmen, however subject to criticism some of their arrangements may have been. They acted under a sense of responsibility for the future of Europe.

But if Europe should risk the consequences of another war, the United States, at least, should endeavor to retain its sanity and its nationhood by refusing to enlist in the fratricidal strife. Hardly any goal now apparent could justify the risks to American welfare which belligerency would entail. It therefore becomes necessary to consider what practical steps the United States should take, and preferably in time of peace, to insure its neutrality.

Strengthening Neutrality

This can best be accomplished by strengthening its neutrality laws and, if possible, by coming to an arrangement with European maritime powers for the restatement of the laws of maritime warfare. In the matter of American legislation, it would be desirable, in addition to the existing neutrality statutes, to authorize the President to embargo the shipment of arms and munitions (to be defined) to both or all the belligerents, and not merely to one or some of them; to prohibit the floating of public loans in the United States on behalf of either belligerent; to prohibit the enlistment of American citizens in foreign armies, not only in the United States, as the law now provides, but also abroad; possibly to prohibit foreign or native representatives of the belligerent powers in the United States from making public appeals for support; to prohibit the entrance into the United States of armed merchant ships or prizes of war; to prohibit the supply of coal or other equipment from American ports to warships at sea; to prohibit to American citizens, and possibly (until title has passed) to American cargoes, if the President deem it necessary, carriage on belligerent merchant vessels.

With foreign nations the effort should be made, as a condition of the debt settlement or otherwise, to restate the law of maritime warfare, as was done by the Declaration of London in 1909, or else to conclude bilateral treaties, as in the seventeenth and eighteenth centuries. Every effort should be made to limit contraband lists, as was done in earlier treaties. It is not so necessary, although desirable, to conclude agreements on blockade or continuous voyage, because existing international law, in spite of the violations of the late war, can be involved. Visit and search should be redefined. It is not impossible to permit joint certification of cargoes by belligerent and neutral representatives in neutral ports. Unless trade with belligerents, and possibly even trade between neutrals, is to cease or to lead to serious irritation, a new understanding on the law should be reached.

In this connection Great Britain is the principal power seeking to avoid commitments on the observance of law (see Article 3 of the Executive Agreement of May 19, 1927), and that fact has had much to do with the growth of navies, especially submarines. It seems hardly likely that weaker powers will abandon the effective submarine unless Great Britain will agree to conform to international law. It does not seem possible that Great Britain will always be a belligerent. There are many factors involved in Great Britain's position as an island which might well persuade that country to remain neutral and return to a conventional position approximating that of the Declaration of London. An agreement might avoid the incipient naval rivalry between America and Britain. The permanent Court of International Justice, should the United States adhere to the statute, might well become also a Prize Court of Appeal.

But in any event, the United States, while defending its right to trade in legitimate commerce, must avoid entanglement in another European war if its future is to be assured. The destructiveness and hence possible shortness, of another war in Europe might well aid the policy of neutrality. Plans for a league of neutrals might properly now be laid. What the effect of war in Asia might be, it is not possible to forecast; but that any good can come from American intervention seems equally unlikely.

Traditional Principles

A return to the traditional principles on which this country was founded, after the demonstration of what departure has involved, would be a boon to the United States and to the world at large. The position has, however, been made more difficult for every nation concerned by the unfortunate type of " so-called peace " treaty, to use President Roosevelt's term, concluded at Versailles and by the unfounded idealization of the supposed " peace machinery " there brought into being. The consequent disparagement of international law has damaged the fabric of international relations and contributed to that intensified nationalism which breeds hostility and conflict. The support of projects to which the harsh facts have refused to yield has weakened the traditional law, now more badly needed than ever. The panaceas have failed and left us with a weakened constitution and a weakened legal resistance to force. It was but little service to peace to try to disavow the law in the name of the new dispensation. It is time to be rid of the psychosis of unreality and to take up again the thread of law which connected the past with the present and will connect the present with the future. There are no short cuts to keep in order so motley a world as this.

It was once the opportunity of the United States to serve itself and the world by promoting the doctrines of neutrality, non-intervention, arbitration, mediation and the recognition of governments in fact. These conservative doctrines helped to bring to the nineteenth century one of the greatest periods of prosperity the world has known. Adventures in international relations, especially when unfortified by experience, bring their own reward. It is now with us. Let us return to the time-tested respect for the law which has at least brought us long periods of peace and permitted some advancement in human affairs.

Japan, Philippines' Safeguard*

Writer Sees Dangers in any Treaty of Neutralization and Urges an Alliance with Nippon

By PIO DURAN, Professor of Law, College of Law, The University of the Philippines

WITHIN a decade, the Philippines will be independent. Responsibilities in the maintenance of government, which have not hitherto weighed upon her shoulders, will have to be assumed as a necessary consequence of her newly acquired status in the family of nations. The preservation of peace and order, the administration of justice, and the conservation of the guarantees of civil rights are problems which will no doubt occupy the best minds of the country. But with these, the nation has been familiar during the past 30 and odd years of American occupation. The successes and blunders of that period will stand out boldly to serve as lessons to the new state.

It is the preservation of the territorial integrity of the Philippines—national defense—will present the gravest problem which the country will have to solve. For, of what use would an orderly administration of justice be, if the territory of which the nation is composed would be partitioned among foreign powers? Of what use would the guarantees of civil rights be, if after all, the country may be snatched overnight by a greedy conqueror? Would the maintenance of peace and order within the boundaries serve any useful purpose to the Filipinos, if the territorial integrity of their country is not respected by other nations?

It is high time for the Filipinos, now that they stand at the threshold of complete freedom, to decide what program to follow, what course to take in the matter of conserving the Philippine islands for their people. The problem of national defense is one the solution to which may not be found overnight. It will tax the best brains of the country and upon its proper treatment will depend the future of the Philippine Republic.

The contact of the Filipinos with the Americans has not taught the Filipinos even the rudiments of national defense. Since 1900, the United States exclusively, without the intervention of the Filipinos, has undertaken the task of safeguarding the territorial integrity of the Philippines. It has been the policy of the United States to keep the Filipinos in ignorance of this important activity of the state.

Under the new organic law of the Philippines, which will be drafted by the representatives of the people in compliance with the provisions of the recent Independence Act more popularly known as the Tydings-McDuffie Law, I hope that there will be found sufficient authority for the new government to create a force that will constitute the nucleus of an able system of national defense adequate for the purposes of an independent Philippines a decade hence.

Measures for Defense

It is an admitted fact, however, that the pupulation and resources of the country will not be able to develop a military and naval force sufficiently strong to withstand attack from any of the first class powers of the world. That in itself, would not be an obstacle to the country's independent existence. Such inadequacy of defensive measures, however, creates the necessity of seeking other means, within the realm of international law, by which to supplement the future Philippine army and navy in the duty of safeguarding the territory of the Philippine islands. It is this supplementary phase of our national defense which will be discussed in this article.

Perpetual Neutrality

The Tydings-McDuffie Independence Law provides in Section 11 that:

"The President is requested, at the earliest practicable date, to enter into negotiations with foreign powers with a view to the conclusion of a treaty for the perpetual neutralization of the Philippine islands, if and when Philippine Independence shall have been achieved."

This section of the law does not constitute a condition *sine qua non* to the granting of Philippine independence. Rather, it presumes the independence of the Philippines before the President may negotiate such a treaty. It is not mandatory in character. If the Philippines, therefore, should refuse such a form of guarantee of her territorial integrity, such refusal would not constitute an obstruction to the continuation of her independent existence. Since the Filipino people have the rights to say whether or not they prefer to have their territorial integrity guaranteed by a perpetual treaty of neutralization, it should be the concern of every thoughtful citizen to study the advantages or disadvantages of such a treaty.

One thing is certain: Whatever attitude the Filipino people may take on the matter, in arriving at their decision, they cannot disregard the actual political and economic conditions of the Far East. The existence of an independent neutralized country such as that contemplated in the section of the Tydings-McDuffie Independence Law referred to above will affect tremendously the conflicting political and economic forces which have lately turned the Far East into a veritable battlefield of political wit and diplomacy.

There have been predictions that it is only a question of time before the verbal and diplomatic clashes which occur almost daily in the Far East will be converted into an actual armed conflict between the Orient and the Occident. There must be no mistake, therefore, in the attitude which the Filipino people should take in connection with the acceptance or rejection of the offer made by the government of the United States to negotiate for the perpetual neutralization of the Philippine islands.

Consequences of Neutrality

A treaty of neutralization is one entered into between a weak nation and a group of strong powers for the purpose of guaranteeing the territorial integrity of the former. If such a treaty were to be negotiated for the Philippines, most probably, Japan, the United States, England, France, the Netherlands, Italy, Russia, Germany and China would join in a pledge to respect the independence of the Philippines. Belgium's independent existence was guaranteed by such a treaty among the signatories to which were Germany, France and England.

But what are the possible consequences of such a treaty? It would undoubtedly lead to a demand from the guaranteeing powers for equal opportunities of trade in the Philippine islands. Such an imposition not only would be consistent with the concept of a neutralized state, but would also be in line with the famous Open Door Policy conceived by Secretary Hay for the guidance of foreign powers in their dealings with China.

Necessarily the application of the "most favored nation" clause to all such powers would follow as a matter of course. Before accepting such a bargain, the Filipinos should review carefully the fate of other nations that have accepted protection in that manner.

The example of China furnishes an excellent index to the consequences of guaranteed equal treatment of all nations. When at the beginning of the 20th century the Boxer uprising occurred, the United States through its envoys in China advocated "the principle of equal and impartial trade with all parts of the Chinese Empire."

This was a warning to all the great powers of the world who were then mapping out their own spheres of influence in China, preparatory to her partition, that the United States would not tolerate any monopolistic, non-competitive, or preferential commercial agreements with or concessions from China. In effect, the United States claimed for her the application of the "most favored nation clause." Accepting this policy, known as the Open Door, as the best means of preventing the partition of China, the foreign powers that intervened in the Boxer uprising agreed to respect the wishes of the American people.

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* *The Osaka Mainichi*

America then was not a predominant factor in Oriental politics and her wishes could not outweigh the combined plans of the European countries. But why was her Open Door Policy accepted ? Because it suggested a means of escape from possible complications which might arise out of any contentious schemes to subdivide China. The great powers of the world were ready to fight each other for the loot. Thus we see that conformity to the Open Door Policy was due more to the desire of the foreign countries to avoid a quarrel among themselves, which could easily have proven disastrous, than to any solicitude for the welfare of the Chinese nation.

Guiding Basis for 20 Years

For 20 years, the Open Door Policy was the guiding standard by which the conduct of foreign nations toward China was judged. Every attempt on the part of any foreign power to obtain monopolies or other advantageous commercial arrangements anywhere in China was promptly protested by the United States as violating the Open Door Policy. At the time the 21 demands of Japan were served on China, the United States of its own accord announced that she "could not regard with indifference the assumption of political, military, or economic domination over China by a foreign power, and hopes that the Japanese government will find it consonant with its interests to refrain from pressing upon China an acceptance of proposals which would, if accepted, exclude Americans from equal participation in the economic and industrial development of China and would limit the political independence of that country."

And still later on, the Japanese government was notified that the United States "cannot recognize any agreement or undertaking which has been entered into or which may be entered into between the governments of Japan and China, impairing the treaty rights of the United States and its citizens in China, the political or territorial integrity of the Republic of China, or the international policy relative to China commonly known as the Open Door Policy." The United States has denied the right of China to enter into any agreement or treaty with any other foreign power which would tend to hamper or curtail the freedom of Americans to trade in any portion of the Chinese Republic.

It results therefore that by virtue of the operation of the Open Door Policy, China could no longer exercise her sovereign right to enter into such treaties and agreements respecting her commercial intercourse as she may deem it wise to conclude. Her international policies were subjected to the combined veto power of the very nations that pretended to save her from being partitioned.

Thus indirectly her commercial development was controlled by outsiders who were singularly concerned with the expansion of their trade rather than with the welfare of the Chinese people. Although domestically speaking China was a sovereign country, internationally she had been reduced to a puppet in the hands of foreign powers. This was the immediate consequence of the application of the Open Door Policy.

Then came the Washington Conference for the Limitation of Armament in 1921. At this meeting of all the principal powers of the world, there was concluded a treaty popularly known as the Nine Power Treaty. In substance the signatories thereto agreed to respect the territorial and administrative integrity of the Chinese Republic and to allow China the "most unembarrassed opportunity" to develop herself as a nation. In effect this was a re-statement in a more formal and binding manner of the principle of the Open Door.

Frank Confession

It was an attempt to put in writing a practise which had been more or less assiduously observed by the great powers for the past 20 years in their intercourse with China. At that conference it was admitted by no less a personage than Arthur Balfour, England's mouthpiece, that the partition of China was prevented by the great powers because "in China's interest, as well as in their own, they had to guard against their exclusion from legitimate opportunities of enterprise."

Judging that frank confession in the light of the events which transpired after the signing of the Nine Power Treaty, one cannot escape the conclusion that again China's interest was not at all the predominating factor in the conclusion of that agreement. There are Americans, for instance, who contend that this treaty is self-perpetuating by virtue of the absence of any expiration date thereof or of any provision for its periodic revision. Inasmuch as the treaty imposes upon China limitations which take away from her the power to enter into commercial treaties with any single nation or group of powers, it, in effect, denies the right of China to choose with whom to deal.

Under such a state of affairs, her economic development has been greatly hampered. And if the treaty be a permanent one, so would China's economic bondage be. An interpretation which gives eternal life to such a treaty must concede a state of permanent guardianship over China by the powers that signed it. In the perpetuation of such tutelage it is hard to believe that China's welfare, rather than the foreign interests in China, is the motivating factor. Eternal control, whether economic or otherwise, by one country over another, is never beneficial to the subordinate state.

History shows that the Occidental powers that signed the Nine Power Treaty have never, previous thereto, taken the trouble of helping a weak Oriental country to its feet purely for altruistic reasons.

The case of the Philippine islands is in point. In spite of high sounding promises of independence and self-laudatory protestations of disinterested trusteeship over the Philippines, America's policy has been the exploitation of the Philippine market for the benefit of American manufacturers and at the expense of the Filipinos.

This is the fundamental reason behind the consistent refusal of the American Congress to surrender to the Philippine government the power to control through the medium of the tariff, the trade relations between the two countries.

If the Americans have recently shown a disposition to fulfil their pledge of independence it is not due to any love or appreciation for my people, whom they despise socially in common with all Asiatics.

It is not due to a recognition of any rightful claim to freedom which the Filipinos may have asserted. It is due to the fact that competition offered by Philippine products no longer makes it profitable for America to retain the Philippines. Why should it be assumed that in the case of China the Occident was prompted by unselfish motives ? When the Occidentals deal with the East, they very conveniently drop the word "unselfishness" from their vocabulary.

At the present time the Occidental nations that promised "to provide the fullest and most unembarrassed opportunity to China to develop and maintain for herself an effective and stable government" are the very ones selling arms and munitions to the different Chinese warlords so that they may continue their fractricidial wars.

Japan has objected to the further and continued sale of arms to China, asserting that the warfare among the Chinese warlords stimulated by this arms traffic is a menace to the peace of the Orient. But no sooner had Japan's protest been announced than the whole combination of Occidental countries branded her attitude as a violation of the terms of the Nine Power Treaty. Situated as they are, 10,000 miles away from China, they view the armed conflicts therein as a stimulant to their trade.

They care not whether China be torn to pieces by the acts of her own selfish leaders. That is the attitude which shows the west in its true colors. And yet there are those who still believe that the Open Door Policy and the Nine Power Treaty were conceived for the benefit of China!

China Chained to Pact

Only recently an opportunity presented itself for the restatement of America's interpretation of this treaty of self-abnegation known as the Nine Power Treaty. In the case of Manchoukuo, Secretary of State Stimson contended that not even China could voluntarily or otherwise violate her own territorial integrity! In other words, China could not for instance cede by treaty or lose otherwise even a square inch of her territory without a violation of the Nine Power Treaty.

Under this interpretation, China has lost her sovereign power to dispose of what is her own. A more humiliating state of bondage, to which an admittedly independent state has been subjected, is hard to imagine. Under the western view China might as well be classified with the colonies in Africa and the Far East under the mandate of the League of Nations.

These are the reasons why I contend that the Open Door Policy and the Nine Power Treaty are the embodiment of the selfish plans conceived by the western powers to entrench themselves in the East. As a result thereof, whatever trace of sovereignty

China preserves to-day is confined to the administration of her internal affairs. Her international relations are dictated by the signatories to the Nine Power Treaty, which of course means the Occident.

Even now the League of Nations is beginning to meddle in the domestic affairs of China and it will only be a question of time before the League will establish its own *de facto* government in China, unles the Chinese people themselves come into their own and throw off the yoke of western influence.

If, as I have demonstrated in the foregoing discussion, a treaty of neutralization would give rise to a demand on the Philippines for equal treatment of all guaranteeing powers, the Filipinos should reject such a treaty because it would reduce the Philippines to a state of virtual economic bondage identical to that in which China finds herself to-day. From the status of an American colony, the Philippines should not plunge into a state of international servility.

Neutralization Farce

But there is one other potent reason why the Filipinos should reject a perpetual treaty of neutralization, and that is, that none of the signatories thereto, with the exception of Japan, would be willing or able to take direct, positive, and affirmative action in case of necessity to defend the territorial integrity of the Philippines.

Take the case of the United States. I do not believe that under a treaty of neutralization she would go to war to defend the territory of her lost empire in the Pacific. She refused to join the League of Nations because the covenant of the league provided that the members thereof were in duty bound to defend any aggression committed upon any co-member. Such an automatic commitment, the United States contended, meant a surrender of her sovereign rights not sanctioned by her constitution.

Senator Lodge stoutly maintained on the floor of the Senate that the United States would not consent to delegate the power granted to Congress by the Constitution to declare war to any association of nations. He claimed that the power to declare war pertained exclusively to the Congress of the United States and that the existence of a crisis in world affairs, such as the invasion of the territory of a member of the League, should not and could not automatically drag the United States into war by virtue of the provisions of the covenant of the League.

This contention which has now gone down to history as the battle cry which wrecked the hopes of the United States of becoming a member of the League of Nations, received the overwhelming sanction of the American people as evidenced by the rejection of the covenant of the League of Nations. Now, I ask: if the United States was unwilling in the name of the entire human race and for the sake of the civilized world to join an association of nations which automatically committed her to go to war when a certain state of affairs arose, such as the invasion of the territory of a member of the League of Nations, how could we expect her to commit herself to a treaty with the great powers of the world obliging herself to go to war in defense of the Philippine islands in case of foreign invasion? Her policy toward the Philippines has always been that of responsibility commensurate with her exercised authority.

It would be the height of optimism to expect that on the occasion of her relinquishment of sovereign rights over the Philippines she would announce to the world her intention to make war upon any nation that would dare violate the territorial integrity of an independent Philippine nation.

What then is the treaty of neutralization to which section 11 of the Tydings-McDuffie Independence Law refers? It must be one similar to the Nine-Power Treaty wherein the signatories thereto would pledge to respect but not protect the territorial integrity of the Philippine nation. That is the only kind of neutralization treaty which the United States under its constitution can conclude.

The commitments thereunder would be in the nature of a promise not to invade or take territory, but would not compel the United States or any other signatory power to defend the Philippines against foreign invasion. Such a treaty of non-aggression would, of course, be of little or no value to an independent Philippines, considering the sacrifices already discussed, which it must bear in exchange therefor.

Would England, and the other European nations resort to arms to defend the Philippines against attack by a foreign power? It would be logical to assume that if the United States be unwilling to adhere to any treaty that would commit her automatically to go to war in defense of Philippine territory in case of its invasion, the other Occidental powers would be less disposed to take such action for the benefit of the Philippines. Not one of the Occidental powers now has or ever will have such an interest in Philippine affairs as to induce them to go to war to uphold the independence of the Philippine Islands.

Powers' Pact Record

France, Germany, England, Russia and Italy now have commercial interests in China or the neighboring islands much more vital than they ever will hope to have in a free Philippines and yet they have not in the past demonstrated any desire to go to war to uphold them. They, in conjunction with the United States, have been loudly vociferating against the alleged high handed attitude of Japan toward China on the occasion of the presentation of the famous 21 Demands which they claimed was violative of the Open Door policy.

Recently they have also branded the creation of Manchoukuo as an infringement of the Nine-Power Treaty which in effect is a treaty of neutralization. But have they been willing to take drastic and direct action to average the wrong which according to their claim China has suffered in the hands of the Nipponese Empire? Not even the League of Nations, of which China is a member, has been able to help her.

Although the prestige of the League was involved in the case of Manchoukuo, and notwithstanding the fact that the small power members of the League have unanimously demanded the punishment of Japan, these same great Occidental powers, from whom an independent Philippines may hope for a pledge to guarantee her territorial integrity, have not even shown the slightest interest in applying the economic sanctions provided for in the covenant of the League for punishing a rebellious and recalcitrant member.

It is, therefore, safe to assume that such assistance as we may expect from these Occidental nations would consist simply of lip service which they, by nature and temperament, are wont to offer in superabundance in the Far East. If none of these Western powers would go to war to protect the Philippines, then why accept a treaty of perpetual neutralization as is suggested in section 11 of the Tydings-McDuffie Independence Law?

At the beginning of this article, I stated that acceptance or rejection of a treaty of neutralization must be decided by the Filipino people, in the light of contemporary politics in the Far East. At the present time, one cannot fail to perceive in the Orient the clash between two contending forces.

On one side we hear the thundering voice of Nippon—mightiest of all Oriental nations—proclaiming to the world her " hands off " policy toward China and advocating Monroeism in the Far East under her leadership, and raising the battle cry of " Asia for the Asiatics."

On the other side we see the strong combination of money-mad, greedy and intriguing Occidentals reiterating the Open Door policy toward China and clamoring for equal opportunity for all.

" Equal opportunity for all " as an abstract principle is sound. But when uttered by the lips of a white man to an Oriental it loses all its charm. For, as Karl K. Kawakami has rightly said " the Occidental has two standards of morals and justice —one for himself and another for the East." He clamors for equal opportunity for all in the East, and yet denies the Oriental the same thing in the Occident. He would see his countrymen flock to the East but would limit Oriental immigration to the West.

He would justify the seizure of India and Egypt, but would condemn the recognition of Manchoukuo by Japan. He would see nothing wrong in a punitive expedition to Mexico or Nicaragua, where his country has no political or governmental concern, but would not bear to see Japanese expeditionary forces defending large tracts of land in Manchuria wherein Japan has property as well as political and government interest.

He would point to Japan as an ambitious country that had annexed Chosen, but forgets that Hawaii was acquired in much the same way. He would sanction the acquisition of Hongkong and Weihaiwei by Great Britain and of Indo-China by France, but would insist upon Japan relinquishing her claim to the Liaotung Peninsula after it had been ceded to her by China as a result of the Sino-Japanese War.

He would tolerate the seizure of Tsingtao by Germany, but would insist upon its return to China after Japan had conquered it during the World War. Those and many more examples of the double standard of justice of the white man in his relations with the Orientals may be enumerated.

Japanese Protection Ample

In the face of these facts no other sound recourse is open to the Filipinos than to side with their Japanese brothers of the North and help them preserve Asia for the Asiatics. If the Philippines should accept a treaty of neutralization from the Occidental powers, she would be adding strength to their pretensions in the Orient for she would be forced to treat them on an equal footing with her sister nations of the Far East. It is my opinion that such an act would tend to weaken rather than strengthen that sane and militant Japanese leadership in the Orient, which the Filipinos as Orientals are in duty bound to respect and support, firstly for their own sake and secondly for the recognition of Oriental superiority in the Far East and Oriental equality elsewhere.

On the other hand, if sufficient guarantees are needed to maintain intact the territorial integrity of the Philippines, a treaty with Japan and China would be more than ample for that purpose. Japan is the only country in the world that can adequately defend the Philippines from foreign invasion. The strength of the Japanese navy is sufficient to maintain herself supreme in the waters of the Far East.

If the Japanese demand for naval parity prospers, with more reason should the Filipinos covet Japanese protection. Japan's geographical situation will force her to the rescue of the Philippines in case of need, for the Philippines in the hands of a hostile Occidental power would not only be destructive of her leadership in the Orient but would constitute a serious menace to the Empire.

The Filipinos must approach the Japanese Empire for the conclusion of an offensive and defensive alliance as the most effective means of insuring the independent existence of their country.

There is reason to believe that Nippon would prefer such a treaty with the Philippines to a treaty of neutralization to which the powers of the Occident would be signatories. For invocation of Japanese aid and protection would mean a recognition of Japanese leadership in the Orient and the strengthening of the bonds of brotherhood that should link all Asiatic races.

There is, of course, the fear engendered in the minds of many Filipinos that such a step might lead to the eventual annexation of the Philippines to the Japanese Empire. There are those among my people who honestly and sincerely fear that such a course of action might stimulate Japanese ambitions to extend southward the boundaries of their Empire. These apprehensions, however, are the product of white propaganda during the last two decades, designed to stifle the Filipino cry for freedom.

It is in line with the Occidental policy of *divide et impera* which has strengthened the Westerners in the Orient. Ever since the European powers intervened to prevent the consummation of that alliance between China and Japan which Prince Ito and Viceroy Li Hung Chang discussed at Shimonoseki at the conclusion of the Sino-Japanese war in 1895, Occidental diplomacy has always endeavored to set one Oriental country against another.

Accordingly, the example of Chosen is now being held before the Filipino as proof conclusive of Japanese territorial ambitions, in order to instill in their hearts a fear of Japan; but they are not unmindful of the fact that the acquisition of Chosen was a matter of life and death to the Empire because, as has been rightly said, Chosen in the hands of a foreign power, is like a dagger pointed at the very heart of the Japanese Nation.

Case of Manchoukuo

Again, the recent case of Manchoukuo is being cited as the product of Japanese territorial designs. The very act of Japan in recognizing the independence of Manchoukuo belies the charge that she covets Manchurian territory.

Japanese recognition of Manchoukuo as a separate state was dictated by a desire to promote peace in a country situated at the very doors of the Japanese Empire. Japan has tolerated for fully two decades the non-existence of a responsible government in Manchuria and the continued menace of its bandits, not only to her own property and property rights in Manchuria, but also to the eastern borders of her Empire.

She has endured Russian pretensions in Manchuria for that length of time in order not to disturb the peace of the Orient. But with the death of Chang Tso-lin, all semblance of organized government in Manchuria disappeared and the country has since been torn to pieces by the marauding bandits who respected neither the life nor the property of its native or foreign population.

With anarchy thus laid at the very doors of her Empire, what could the world expect of Japan? Could we expect her to look on complacently at the agents of chaos and disorder knocking at her very doors? Could we expect her to be indifferent to the destruction of her own property in Manchuria and of those of her own citizens, by hordes of ruthless brigands who respected neither law nor order? Could we expect her to smile sympathizingly on those responsible for the assassination of Japanese subjects in Manchuria?

Japan owns property and has special interests in Manchuria which no other nation has. As a result of the Russo-Japanese War, she acquired the southern portion of the Chinese Eastern Railway line, which is now known as the South Manchuria Railway, and also the leased territory of Kuantung. She owns and operates therein extensive mining concessions into which her government and her citizens have poured millions of their wealth.

She exercises political and governmental control over the South Manchuria Railway areas and the Kuantung leased territory, and for the safety of the inhabitants residing therein and their property the Japanese government is responsible. One half of Japan's trade with China was with Manchuria. The supply of the principal raw materials which the Japanese factories at home need comes from Manchuria.

As long as peace and order were maintained therein trade went on, but when nearly half a million bandits in a country of 30,000,000 inhabitants roamed unmolested, robbing the farmer of his products and blocking the avenues of trade, then the Japanese industries at home immediately felt the repercussions of such lawlessness and were threatened with temporary or permanent closure. A stoppage or even a curtailment of the supply of raw materials from Manchuria meant a paralization of certain industries within the Empire and one out of every 20 of her inhabitants would have suffered therefrom.

All these special interests have been recognized in the Ishii-Lansing "gentlemen's agreement." About two years ago, not only were these vital interests seriously menaced, but the very peace, tranquillity, and security of her empire and the other territories bordering on Manchuria were jeopardized. These were the forces which drove Japan to intervene in Manchuria.

Out of Sheer Necessity

Her expedition was thus dictated by the necessity of defending the safety of the Empire and preserving the peace of the other portions of the Far East which were threatened to be engulfed by the forces of anarchy within the grip of whose tentacles Manchuria has suffered and bled for years. Which of the powers in the Far East, if not Japan, can undertake such a task?

Had a first class Occidental power been placed in the position in which the Japanese Empire found itself during the last 20 years with respect to her relationship with Manchuria, pretexts for the annexation of the latter country would have been found in abundance and recognized by the council of civilized countries. Witness the case of Russian intrusion in Mongolia.

In 1921 Soviet Russia not only fomented a revolt in Mongolia, but sent a Red Army there to overthrow the government. This being accomplished, she immediately recognized the *de facto* revolutionary government and entered into a treaty of mutual protection with Mongolia as a separate entity.

Russia had no special interests in Mongolia to protect. Her existence, her security and the peace of her inhabitants were not menaced by the Mongols. Her action in this regard was motivated solely by the Occidental greed for territorial expansion at the expense of the East. And yet the world was not entertained by any Lytton reports or by perfervid protests from the other Western countries because it was a white nation that had plotted to dismember a portion of China.

Thus we see that if Japan has acquired Chosen, and recognized and supported the independence of Manchuria, it is because the very life and existence of the Empire depended upon such acts. Contrast Japan's attitude in these two instances with the acts of the Occidental powers in acquiring portions of territory in the Far East.

In the former case, Japan's action was dictated by the right of self-protection and self-preservation, while in the latter instance the Occidental nations were actuated by their greed and rapacity. And yet these are the very nations who, devoid of any regard for the rights of the peoples of the East, would dare to criticize the actions of Japan in her own Oriental sphere!

But let us for a moment assume that Japan truly desires to annex the Philippines to her Empire. I have demonstrated above that none of the Occidental powers would be disposed to check Japan's ambitions in that respect. And even if there be one or more of them who might be willing to resort to arms to prevent the annexation of the Philippines to the Japanese Empire, they do not now or in future will have sufficient armed forces at their command to do so.

Would it not be the sane and statesmanlike conduct of the Filipinos to seek the friendship of Japan by invoking her protection rather than to antagonize her by leaning upon her rivals—the westerners? Even if the argument be carried further and it be assumed that the Occidental powers might forestall Japanese acquisition of the Philippines, for what price would they assume that risk? The inevitable result would be the repetition in the Philippines of the case of China.

While nominally independent, the Philippines would in fact be under Western domination. If it be the fate of the Philippines forever to be under the control and domination of a foreign power, the Filipinos, I am sure, would rather see their country under the sovereignty of an Oriental nation than owe allegiance to a Western power!

There is one more weighty reason why the Filipinos should prefer a treaty with Japan to a treaty of neutralization in which the principal powers of the West would participate; and, that is, that Japan in the short expanse of her international life, has never broken any treaty to which she has been a party.

That is a consequence of Oriental zeal in fulfilling engagements. To the Oriental, a promise made or a pledge given is sacred and its violation is considered dishonorable and disgraceful. This trait is best shown in the manner in which business relations were established among the peoples of the East. Before the commercial dealings of the Orient were polluted by contact with Occidental methods, it was not considered necessary for any kind of business transactions to be reduced to writing.

This was universally true in China, in Japan, and in the Philippine Islands. An obligation contracted orally was as good as written because it was never customary for the Orientals to break their engagements. On the other hand, the Occidentals in their business relations always presume deceit. That is why in all their codes of laws, in the matter of purchase and sale, which is the bedrock of commerce, their guiding principle is *caveat emptor*.

"Let the buyer beware" betrays an insidious spirit of trickery, of bad faith, of fraud from which the Occidentals cannot escape. Deceit is so ingrained in their being, it is so incrusted in the very marrow of their bones, that even in transactions between father and son, to them a written document is indispensable! What trust can be given, what confidence can be reposed in the word of such beings?

Japan's Pledge Never Fails

It can be historically demonstrated that Japan's word in the council of civilized nations, merits a higher respect than the pledges given by the Western powers. The treacherous act of Russia in wresting from China a lease on the Kuantung Peninsula in 1898, at the critical moment when she should have given assistance to China as her ally under the Li-Lobanoff Treaty of 1896 in China's attempt to resist the German claim over Kiaochow reveals the regard which the Westerners have for their pledges of honor to countries of the Orient.

The case of Belgium's invasion during the World War is another eloquent example of the facility with which Occidentals disown the treaties they sign. Contrast those cases of international breach of faith with Japan's attitude during the World War. Her entry into that war was dictated by the imperious force of her pledged word to Great Britain in the Anglo-Japanese alliance, to go to England's assistance in the Far East in case of armed conflict.

Well might the West learn from Japan what international honor means! In the face of such historical facts, it would be the height of poor judgment for the Filipino people to rely upon any promised protection by the Occidental powers.

Even from the economic standpoint, it would be more advantageous for the Philippines to seek a protective alliance with Japan than to accept guarantees under a treaty of neutralization from the Occidental powers. During the last three or four years, in spite of a relatively high tariff wall erected for the benefit of American goods, the Japanese have made tremendous strides in their trade with the Philippines, displacing American cotton piecegoods, construction materials, and other commodities, and relieving the Chinese merchants of a considerable portion of the retail trade. Japan has also become the chief purchaser of hemp from the Philippines. All these facts are indicative of the coming Japanese domination of Philippine trade.

With the sugar industry of the Philippines doomed to death by virtue of the limitations imposed upon the exportation of sugar to the United States, the economic salvation of the Philippines lies in the growth of other products, such as rubber and cotton. The Island of Mindanao alone can supply the entire demand for gutta percha from the United States, and recent government experiments have demonstrated that cotton may be grown in abundance in the Philippine Islands.

Fortunately, these are precisely two of the principal raw materials which Japan needs. Reciprocal preferences in Japan for these raw materials and in the Philippines for Japanese manufactured goods could be established by means of commercial treaties and agreements. In that manner, a preferential market for Philippine raw materials is assured and a supply from Japan of manufactured necessities is guaranteed under mutually profitable conditions.

These conditions, however, can only exist if the Philippines is not subject to any treaty of neutralization, because if she were, all the guarantors of Philippine independence would demand the same treatment under the "most favored nation" clause.

But suppose such concessions should likewise be granted to other guaranteeing powers under a neutralized status, what would happen? The markets of the Philippines would be opened wide to the influx of manufactured products from these countries, and Japanese goods would be laid open to competition. Such a state of affairs would not be conducive to the development of the Japanese market for Philippine raw materials for they would naturally be treated on the same plane as the raw materials emanating from other countries.

No preference may be claimed by Philippine raw materials in the Japanese market if Japanese-made commodities are not accorded favored treatment in the Philippines. On the other hand, the Philippines will receive no benefit under such an arrangement because all the possible guarantors of Philippine independence, except Japan, have their own colonies from which they purchase their supply of raw materials.

The result is, therefore, that while the Philippines will buy their manufactured goods, they will not purchase Philippine raw materials. Thus we see that equal treatment by the Philippines of Occidental countries and Japan would be economically disastrous to the Philippine market, whereas a preferential arrangement with Japan would redound to the mutual benefit of both countries.

Conclusion

Within a decade the Philippines will have to make a momentous decision—one which will be determinative of her future existence as an independent state. No one can accurately forecast what political complications may arise in the Far East during that period of time, but keen observers of past and contemporary events in the Orient are unanimous in their estimate that the chief controversy in the Pacific to-day and perhaps in the next few years to come, is whether or not Japan should be recognized as the leader of Asiatic nations and races, responsible for the maintenance of peace in this part of the globe.

All disputes and disagreements either among Oriental nations themselves or between Occidental powers on the one hand and Oriental countries on the other, revolve around that chief and

(*Continued on page 397*)

A New Aspect of Manchoukuo

By KANZO SHIOZAKI, in the "Asiatic Review"

JAPAN'S position in Manchuria has undergone a fundamental change since the Manchurian incident of 1931. Before the incident, Japan's cardinal policy in that region was in the main to preserve her legitimate rights and interests acquired after the Russo-Japanese War of 1905, and to maintain tranquillity and order, so that foreigners might pursue their legitimate occupations peacefully in that region. In fact, since the Russo-Japanese War, Manchuria has often been the scene of international animosities, and in recent times the militarists formerly in power were only too eager to undermine Japan's vital interests in Manchuria. The Manchurian incident, in our view, resulted from an act of self-defence to which Japan was obliged to resort to protect her rights and her nationals, whose existence was threatened by the old Chinese régime.

The new State of Manchuria, or Manchoukuo, was established by the populace in that region, who took advantage of the outbreak of the incident of 1931. It appears that the outside world conceived of the new State as having been founded through the activities of the Japanese military officials, and not as having been created by an independence movement originating with the people of Manchuria themselves. The independence movement was no less than the expression of the instinct for social survival of the Manchurian people. That the people of Manchuria have the instinct of survival can be explained by the fact that Manchuria has historically always constituted an entirely separate political unit from China, distinctive in sentiment and tradition, and also by the fact that the people endured with fortitude the poverty and distress to which they had been reduced by the tyranny and extortion of the Changs.

To those who know the pre-incident state of things in Manchuria, it is inconceivable that such a big movement as the independence of Manchoukuo could have been brought about merely by means of intrigues or the instigation of foreigners. And now, whatever the motives and manner of its creation, Manchoukuo is a *fait accompli*. The relevant question which confronts us is not how the new State came into being, but what bearing it will have in the future upon the peace of the Far East.

Manchoukuo, after the declaration of her independence, naturally and reasonably desired the assistance of Japan, particularly in view of the attitude of her southern neighbor, who endeavored to hamper the peaceful development of the new State. The policy of the Government of Manchoukuo meets the wishes of Japan, as it respects Japan's legitimate rights and interests in the new State. Japan, on her part, rightly conceived that her interests would be secured only by encouraging the sound development of the new State. Upon this conviction Japan acted, and, in the face of strong opposition from her neighbors and the League of Nations, she recognized the new State of Manchoukuo.

In so doing, Japan conceived that she was taking the only possible course to ensure the security of her rights and to preserve peace in the Far East. The League of Nations, from which Japan was obliged to withdraw on account of the fundamental difference of views, saw in the separation of Manchuria from China a permanent cause of friction between Japan and China and of turmoil in the Far East. But Japan considered that no security or tranquillity could be attained in the Far East except through the independence of Manchoukuo. It should be remembered that the Imperial Rescript promulgated on the occasion of Japan's withdrawal from the League of Nations proclaimed that: "Now Manchoukuo having of late been founded, Our Empire deems it essential to respect the independence of the new State and to encourage its healthy development, in order that the sources of evil in the Far East may be eradicated and an enduring peace thereby established." To secure the development of Manchoukuo is the responsibility incumbent upon Japan, not only for the peace of Manchoukuo and of the world, but for her conscience itself.

The majority of the people of Manchuria belong to the Han race, which has traditionally cherished the political ideals of the "Kingly Way." They were forced to revolt against the despotism—the antithesis of the "Kingly Way"—of the former Chinese military régime under which they had suffered in misery for many years. They started to bring about their long-cherished political ideal, which seeks the peace and prosperity of the people as a whole. Japan, having recognized the new State, exerted her utmost efforts to assist in the speedy realization of the ideal of the Manchurians—the fundamental principles of the new State. By helping the sound development of the ideal of the "Kingly Way," Japan is convinced that she is serving to sustain civilization and contributing to the peace of the Far East.

The State contemplated by the "Kingly Way" is one of moral government. It holds spiritual happiness as of no less importance than material prosperity. It desires to establish a land of peace for each and all, irrespective of color, race, nationality, or class. Manchoukuo is confident that she is able to serve the cause of mankind by contributing to the world a new statecraft of moral government which is different from any form of government existing hitherto, whether capitalistic or communistic, autocratic or democratic.

The sound and peaceful growth of Manchoukuo, as we believe, is a foundation upon which the friendly relations between Japan, Manchoukuo, and China will be regulated. The unnaturally strained atmosphere which has covered the Far East for so long will be cleared. If, however, the Government of the "Kingly Way" is not firmly established, it is to be feared that China will continue her resistance to Japan, and no peace can be expected between China and Manchoukuo. Japan will then be compelled to take political or economic measures, with a consequent protracted strain on international relations and no prospect of the blessings of peace.

Manchoukuo is now striving to realize the ideal of the "Kingly Way" through material reform within her realm. Although the new State is but an infant of less than two years, this short period has nevertheless witnessed a marvellous development in many aspects, political, military, and economic.

First of all, a word on the peace and order in the State. Bandits who formerly numbered about two hundred thousand, have recently been reduced to fifty or sixty thousand. Month by month the general situation within the borders of the new State has improved.

Equally significant is the problem of the public finance of the new State. In 1930 the total revenue of the Government under the Chang régime amounted to 121,590,000 yuan, the total expenditure 142,605,000 yuan, showing a deficit of 21,015,000 yuan. Of the expenditure, 80 per cent—that is, 114,721,000 yuan—was allotted to military expenses. In order to make up the deficit, taxes were arbitrarily increased. In 1924, for instance, the bean tax was raised suddenly to 70 per cent, and what was termed production tax was doubled.

The Manchoukuo Government have started financial reforms by depriving the provincial authorities of their financial control and centralizing the financial system ; a single unified Budget for both central and local governments was inaugurated on a sound basis. Cumbersome minor taxes were abolished and others were reduced. By the improvement of tax-collecting methods, farming-out, squeeze, and all their accompanying evils, were once and for all eradicated.

Thus the first Budget of the new Manchoukuo Government for 1932-33, amounting to MY* 113,308,000, effected a decrease of MY 29,297,000 in expenditure and proportionately decreased the burden of taxation. Compared with the colossal military outlay of 114,721,000 yuan of the Chang régime, the same item in the Manchoukuo Budget for 1932-33 was only MY 33,000,000, a decrease of no less than MY 81,721,000. From 80 per cent of the total expenditure it was reduced to 30 per cent.

The actual result of the auditing of the first fiscal year at the end of July, 1933, showed that actual revenue exceeded the estimate by MY 24,506,000, a fact attributed to the reorganized and well-regulated system of tax collection coupled with the restoration of internal peace and order. On the other hand, expenditure exceeded the budgeted amount by MY 6,500,000, so that a net surplus of MY 18,000,000 resulted.

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* Manchoukuo Yen, worth about 1s. 1d.

The second Budget for this fiscal year (1933-34) was put at MY 149,169,000 for both revenue and expenditure, an increase of MY 35,861,000 as against the amount for the last Budget—an increase amply justified by the result of the audit for the last fiscal year and significant of the progress in general.

In adopting the new Budget, the floating of loans for the purpose of making up a revenue was specially precluded. The loan for the construction of the national capital at Hsinking to the sum of MY 7,000,000 which was listed in the new Budget, was already voted in the last fiscal year, but its floating was spread over to this year. An increase in revenue was expected on the ground that the restoration of peace and order, the stabilization of paper notes, and the regulation of the tax-collecting systems would entail an increase in the amount of Customs duties, internal taxes, and the proceeds of governmental monopolies and other State industries.

In fixing expenditure, the maintenance of peace and order was made the first consideration. The regular payment of the police force is to be assured throughout the country. Special expenses for the maintenance of peace and order and punitive expeditions during the summer months have been provided for. Items have been included for the construction of arterial roads to facilitate the development of industries. In order to help the reorganization of local administration and finance, the necessary grants in aid have been established. Expenses for improving the administration of justice, for raising the standard of judges and other judicial officers, have been found. Funds amounting to MY 7,000,000 have also been provided in the Budget for redemption of capital and interests of old foreign loans secured on customs duties and the salt gabelle. Thus we have witnessed in the new Budget the itemization of departmental expenditure and organized control of local finance, which as a whole may reasonably be construed as showing an advance in the Manchoukuo budgetary procedure.

It may be interesting to refer to the attitude of the Manchoukuo Government with respect to foreign debts. Soon after the establishment of the new Government, the Manchoukuo authorities, in consultation with the foreign Consuls interested, appointed a Commission for the Liquidation of Claims, with a view to settling the claims of foreigners, including Japanese, British, American, German, French, etc. Foreign claims were divided into two categories. In regard to the claims where contracts had been made after 1930 and wherein goods had been duly delivered, payment was made in cash to the creditors' interests of the sum of MY 2,417,125.47, which amount was shared respectively by the creditor nations as follows:

Creditors.	*Amount Paid MY*
Japan	889,114.74
Great Britain	188,937.32
Germany	305,154.82
U.S.A.	28,457.26
Manchoukuo and China	1,002,890.12
Denmark	2,091.56
Others	479.65
Total MY	2,417,125.47

With regard to the other category—namely, the claims for contracts made prior to 1929 inclusive, and contracts wherein goods had not been delivered—it was decided that the approximate total amount of MY 4,000,000 would be adjusted this year by 3 per cent bonds redeemable in twenty years.

The Manchoukuo Government, adhering to the spirit of her declared foreign policy, has gone so far as to pay the railway loan made by the British and Chinese Corporation concerning the double tracking of the Peking-Mukden Railway. It is noteworthy that this loan has been paid in full for the entire amount, comprising not only the liability of the Mukden-Shanhaikwan line, but that of the Peiping-Shanhaikwan section outside the borders of Manchoukuo. The Manchoukuo authorities now make monthly payments regularly on the remaining British loan on the same railway. The Manchoukuo Government has also redeemed the claim of the Netherlands Harbor Construction Works, which had received a contract from the former Chang régime for the construction of the port of Hulutao. These few examples of international good faith on the part of the infant State are in vivid contrast to the attitude of China in regard to foreign loans.

The remarkable amelioration in the public finances of Manchoukuo mentioned above might have been difficult had it not been accompanied and assisted by the change in the banking organizations. In June, 1932, the Central Bank of Manchoukuo was established, amalgamating the four old note-issuing banks of the Chang régime. The amalgamation has done away with the Manchurian markets being flooded with paper money, to the detriment of the commercial and general community. The fifteen different kinds of paper money hitherto in circulation were replaced by the new national currency, and the rates of exchange of the old currencies were officially fixed. The value of the new currency having shown no wide fluctuation since its appearance, this stability has assured its smooth circulation, and all prices are now for the first time quoted in one uniform currency.

Other benefits accompanying the unification and stabilization of the currency are many and varied. The revenue of the Government, which under the old régime was uncertain and undefined, is now secure and dependable. Business circles have been relieved of the ever-present uneasiness resulting from violent fluctuations, and fresh stimulus has been given to industrial activities. The bank now finds itself in a position to make substantial advances to trade and industry.

Preliminaries such as the unification of the monetary system, stabilization of currency, and reorganization of branch banks having been practically completed, the Central Bank is at present giving its attention to banking operations proper, especially financial assistance to industries, lubricating domestic and foreign exchange, lowering the interest rates, advancing funds for Manchurian products and for farming for next spring.

Under the radically improved organization of both public finance and banking, the future economic and industrial outlook of Manchoukuo is bright. Yet the Government of Manchoukuo, *not content with the natural process of development*, proposes to assume the leadership of the economic and industrial life of the nation. This attitude is rather unusual in a Government. Although they do not profess any doctrine such as Fascism or Communism, they have their own ideas on economic questions. In the "Economic Construction Plan" promulgated in March of this year the Government expressed the view that uncontrolled capitalism might be harmful; that it was necessary to apply a certain amount of national control and to utilize the fruits of capital so that the economic life of the great mass of citizens might be elevated and rendered secure, the standard of existence raised, the country's power augmented, and world economy and culture thereby enriched.

In order to attain this objective, the Manchoukuo Government consider it essential to see that the interests of the people as a whole shall be made the keynote, and efforts will be made to prevent the monopoly of any exclusive class of people in the exploitation of natural resources and the development of industries. National control will be imposed on important economic activities for the purpose of developing all natural resources most effectively and co-ordinating various branches of industry.

In practice, the foregoing principles will be put into effect by conducting under official management those enterprises which have an important bearing upon national defence or public utility and benefit. Others may be left to private management, but a certain amount of adjustment necessary to promote general welfare will be resorted to in the sphere of both production and consumption.

In pursuing the new economic program, the Manchoukuo Government adhere to the principle of the Open Door and equal opportunity. In this spirit they invite capital investments from all parts of the world, while appropriate and effective use will be made of the technical skill and experience and other fruits of the civilization of the advanced nations. On account of this attitude of Manchoukuo in welcoming foreign capital, it is reported that French and other financiers have already invested capital in that State for joint enterprise. There is, however, no gainsaying that foreign traders in Manchoukuo are feeling some inconvenience in carrying out their business on account of the fact that the new State has not been recognized by their respective Governments.

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Russian Industrial and Metallurgical Developments*

Developments in Russia in recent years have attracted considerable attention in this country but much more in Continental countries like Germany, which have more intimate relations with Russia than ourselves. The German Press, for example, devotes much attention to happenings in Russia and to the official utterances and communiqués so that it is possible to garner from that source much information as to conditions prevailing in Russia.

The strenuous efforts of the Soviet rulers to industrialize Russia have certainly produced results, but far below the ambitious initial, and subsequently modified, programs. Some of the major industries, including the iron and steel industry, power production and distribution, the automobile and tractor production, the textile industry and the petroleum industry, have undoubtedly been developed considerably, but of these, with the possible exception of the petroleum industry, the results obtained have been disappointing. In many cases the new equipment provided is of the most modern and complete description, and power stations with a capacity to supply these industries with ample electric energy have been erected. A fair efficiency has been reached only in the petroleum industry, and signs are not lacking to indicate that reasonable efficiency in this is maintained only with great difficulty.

Favored with abundant metallic ore resources of nearly every kind, and ample coal resources for the reduction of these ores to metal, the development of the mining and metallurgical industries must be regarded as profoundly unsatisfactory. Generally, all the efforts to industrialize Russia in recent years have failed in a greater or less degree. The main cause for this lack of success is the low efficiency of the Russian industrial workers and the incompetence of the directing heads, both in the planning and in the operations. Continental writers who have had opportunities for observation for months together, invariably stress the inefficiency of the Russian workers and those who direct them. Factory products made locally are characterized by extremely low quality and the percentage of imperfect and unusable articles is very large. A remarkable fact is that the heads of the Soviet Government refuse to be discouraged by these conditions, and steadily continue their efforts, modifying here and adapting there with a view to overcoming the difficulties as they arise.

In a sense, Russia seems to be re-entering the comity of nations. Foreign propaganda, if not entirely given up, appears more or less limited to radio broadcasting. The long delayed recognition of the Soviet Government by the United States, the Litvinoff diplomacy, and the greater readiness of the Soviet Government to enter into trade agreements with other countries have done much to add to Russian prestige in recent months.

Internally, too, the U.S.S.R. appears to be slowly progressing towards an improved condition, both in regard to industrialization and in the welfare of the Russian people. There seems to be no doubt that those who predicted that the industrialization of Russia would take far longer than the time laid down by the Soviet Government were justified. If that result can be accomplished in 20 years it will be a remarkable achievement, but probably much longer will be required to reach the stage of industrialization indicated in the second five years' plan. At present, the Soviet Government appears to be preoccupied with the fear of having to fight Japan in the not distant future and in preparations for such a conflict. This will tend to slow down the industrialization program, while an actual war might delay it indefinitely.

There are some indications that Stalin and his colleagues are beginning to realize the impossibility of continued sacrifices on the part of the Russian people in order to accelerate the industrialization plan. At a Soviet Congress held in Moscow in February, he is reported to have stated that the methods of the second five years' plan must be greatly modified from those adopted during the first five years' plan. Exports at dumping prices and acceptance of large foreign credits at high rates of interest must be disastrous for Russia. Already the more recent figures of Russia's foreign trade show a drastic curtailment of imports ; in this connection, Kagonvitch, the Government financial expert, at the Soviet Congress, said that the machinery required for the further industrialization of Russia must and could be made in Russia itself, and by the end of this year it would be possible to dispense with foreign technical assistance. In the meantime, it is reported that greater attention is to be given to the provision of food, clothing and housing for the Russian people, which implies some reduction in the privations imposed on them in recent years and the cessation of food and other exports sorely needed by the Russians themselves.

In considering the failure of the Soviet authorities to realize their earlier hopes of a rapid industrialization of Russia, it is only fair to admit that the task undertaken was of a colossal character. In the first place, those who have been in contact with the Russian people for any considerable time, say that the great majority of the Russian people have only the vaguest idea of communistic life and are strongly individualistic at heart. Only the young generation have any glimmering of the communistic ideal of the Soviet leaders. Teaching in schools and active propaganda of different kinds are being used to foster the communistic conception and will doubtless be more or less successful.

The efforts towards industrialization have been tremendously hampered by the necessity to recruit an industrial army from a people who, prior to the revolution, consisted as to at least 95 per cent of land workers, the greater proportion of whom were illiterate and to whom machinery other than the simplest and crudest was unknown. Observers who have lived in Russia in recent years, tell us that it is almost impossible for the people of industrial countries like our own to realize the abyssmal ignorance of the Russian peasantry in regard to mechanical devices, even of the simplest kind. Thus a mechanical device, such as a lift installation in a building where nothing of the kind has been seen before, is regarded as a magic toy. Without any conception of its limitation, it is quickly put out of action by excessive use or over-loading, and when this happens no one has any idea how to repair the injury and so it may remain derelict for an indefinite time. This kind of misuse of machinery applies very generally, even in the large works equipped with modern and delicate plant. This is the chief reason why the output of factories highly equipped with the most modern machinery, is often so absurdly below the rated capacity. It is, of course, a temporary phase which will gradually give place to better practice.

In the larger aspect of industrialization there is also great confusion and inefficiency. Power works of great kw. capacity are erected in localities without any real relation to the utilization of the electric energy. There is also a lamentable lack of co-ordination of the different industries. The aim—indeed the necessity—is to avoid all but the most essential imports and to have an industrial system self-contained to the largest possible degree. A self-contained industrial system can function smoothly and efficiently only by complete co-ordination of its various members. In modern industry the tendency towards interdependence of the different branches is always growing ; it is of vital importance that all-round production be proportioned so that these interdependent branches adequately serve one another. It is obvious from the official reports that this lack of co-ordination is one of the great obstacles in Russia in utilizing the newly installed factories. Obviously this kind of difficulty could be overcome by carrying sufficient stocks to cover temporary disturbances in the normal supplies, and in a country like our own supplies can readily be obtained from a number of markets. But in Russia this is not possible and so far only hand-to-mouth methods have been practiced. This is because Russia is in the unique position among countries of the world, of suffering from under-production of nearly everything required. This is a condition which should disappear in the next few years.

One of the greatest difficulties of all in the industrialization of Russia has been the necessity to obtain the great bulk of the machinery and equipment needed from abroad. This material can be purchased only by exporting Russian products like petroleum, manganese and iron ores, gold, platinum, lumber and even foodstuffs of different kinds, or through the limited credit obtainable abroad, which necessity has called for great sacrifices and privation on the part of the Russian people.

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* *The Mining Journal.*

Finally, one of the major difficulties lies in the fact that the greater part of the world has been openly distrustful, if not actually hostile, which has operated to place great obstacles in the way of Russian foreign trade.

With all the disadvantages named, and others that could be mentioned, still Russia is moving in the direction of greater self-sufficiency. This is suggested by the foreign trade developments in 1933. The official report declares that while exports declined by 13.8 per cent, imports declined by about 50 per cent. The favourable trade balance was 147.4 million roubles, and the State income was 10 per cent better and very considerably in excess of the estimates. Possible explanations of the reduced imports are : (1) Difficulties in obtaining credit for purchases abroad, though this is scarcely borne out by the known fact that all industrial countries are anxious to do business with Russia and to grant reasonable credit terms. In this connection, it is understood that the Soviet Government has never yet failed to meet credit obligations promptly. Stalin is reported to have said recently that the existing credit debts of Russia were then about 450 million roubles, compared with 1,400 million roubles two years before. (2) Another explanation of reduced imports is that Russia is gradually becoming less dependent on foreign manufactured imports, and in this respect is nearer being self-contained, which is the Soviet ideal.

As generally known, the Russian first " five years' plan " was brought to a close after the fourth year, when a second five years' plan was inaugurated. The predicted results of this second plan period, as explained officially to the Russian people, are of an extravagant nature, including an increase of the real income of the individual of from 200 to 300 per cent as compared with the income of 1932. A complete realization of the program outlined would certainly give Russia an abundance of products and presumably, greatly improve the average standard of living in Russia. The prospects of this goal being reached appear very poor at the moment, as it is officially admitted that in the first three quarters of the second plan period the average increase in production was no more than 8.5 per cent.

What has been said above seems chiefly relevant to the metallurgical situation in Russia, which must be largely influenced by the general conditions in the country. The metallurgical program for the second five years' plan is of a very ambitious character, and in some Continental quarters has created the expectation that Russia will ultimately become a great producer and exporter of metals. Probably the program is a great over-estimation of the actual possibilities. In the vast territory under Soviet rule, and especially in the Urals and some parts of Siberia, no doubt ample metallic ore resources exist, known or to be discovered, to permit a very large production of several kinds of metals, and if the program of production laid down could be accomplished, it is possible that a considerable surplus would remain for export after satisfying the home requirements. In the meantime, however, Russia is a considerable importer of non-ferrous metals of all kinds and also a considerable importer of steel.

If and when the Soviet metal production program is realized, a corresponding realization of the other parts of the Soviet program should be obtained. This suggests an increase in the home metal consumption which may well absorb the increased output. The requirements of a population of about 160 millions in metals of different kinds, even on a moderate standard of living basis, must be very considerable, and it must be realized that at the present time Russia, with an extremely low standard of living, is starved of metals of all kinds. Obviously also, an increased standard of comfort of the Russian people will mean an increased home consumption of the present exportable products, such as petroleum, flax, wheat, butter and other food products. According to expressions from some of the Soviet leaders at different times in the last year or two, the goal the authorities have set themselves to reach is primarily the self-provision of Russia to the utmost extent possible, rather than to make Russia a great exporter of finished goods and metal products. In any case, before Russia can become formidable as a competitive exporter of metals or finished wares, a great advance in industrial technique must be made ; even if Russia were at present in a position to produce the necessary quantities to permit extensive exports, the competitive value would be small on quality grounds.

Japan, Philippines' Safeguard

(Continued from page 393)

all-absorbing issue of the Pacific. I maintain that acceptance by the Filipinos of Philippine independence under such a treaty of neutralization as proposed in the Tydings-McDuffie Law is a denial of Japanese leadership in the Orient likely to alienate Japanese friendship and sympathy for the Filipinos.

Conversely, the conclusion of a protective alliance with the Japanese Empire as the best means of insuring the continued existence and safety of an independent Philippine nation, is a recognition of Japanese leadership in the Far East which will surely result in the strengthening of the ties of friendship which now link the Japanese and the Filipino peoples.

If the Philippines realizes that under a neutralized status, her independence will be confined to the administration of her internal affairs and her foreign policies will be dominated by meddlesome Occidental powers ; if she realizes that under a neutralized status, she will have only the shadow and the semblance but not the substance and reality of protection ; if she realizes that under a neutralized status she will be the object of economic exploitation by the western powers, then she will reject the proposal of the Congress of the United States to have her independence guaranteed by a perpetual treaty of neutralization.

On the other hand, if she should understand that Japan is the only country in the world who could protect her territory against foreign aggression and who would be willing to do so ; if she understands that it would be economically advantageous to her to accept Japanese protection and guidance : then she will seek and welcome an alliance for mutual protection with the Japanese Empire.

Filipinos for Japan

When that time comes, the first step toward the formation of the confederacy of the Far East will have been taken. Those responsible for the government of Japan and the Philippines have the duty not only to their present constituents but also to the entire Asiatic peoples to begin laying the foundation of a future Filipino-Japanese alliance. That the Filipinos would favor such an approachment between the two countries is attested to by the sincere and spontaneous welcome which they have always accorded Japanese visitors, missioners, traders, and officials who have called on the Philippines.

All Filipinos who have come in close contact with the Japanese, and who have known them, their ways of living and of treating their fellow men, their customs and their habits are unanimous in their expressions of condemnation of American and European propaganda like those embodied in Professor O'Conroy's recent book entitled " The Menace of Japan " painting Japan as warlike, unscrupulous and ambitious.

There are of course a great number of Filipinos who have not known the Japanese people at close range, but who have imbibed Western propaganda against Japan. In the minds of these people a fear of Japan has developed. Now that independence is fast approaching, the Philippine government will undoubtedly take adequate steps to dispel all such unfounded prejudices against Japan as might have been caused by over 350 years of Occidental domination. More than ever the Filipinos desire at this time to establish closer contact with the Japanese, but without the co-operation of the Japanese government and the Japanese residents in the Philippines this wish may never be accomplished.

I hope sufficient interest may be aroused in both countries to awaken them to the fact that they both belong to the brotherhood of the Far East and that Nature has decreed that they be linked together by geographical ties which no power or will of man can break. If among my countrymen there are any whose racial pride has been stifled by the glow and glamor of promised protection from the Occident,—to them I repeat that famous phrase of Rudyard Kipling which embodies Western scorn for the Orient:

" East is East, and West is West,
And never the twain shall meet."

Water Supply in Hongkong

The Story of a Triumph of Applied Science

By Professor C. A. MIDDLETON SMITH, M.Sc., M.I.Mech.E. (Dean of the Faculty of Engineering in the University of Hongkong)

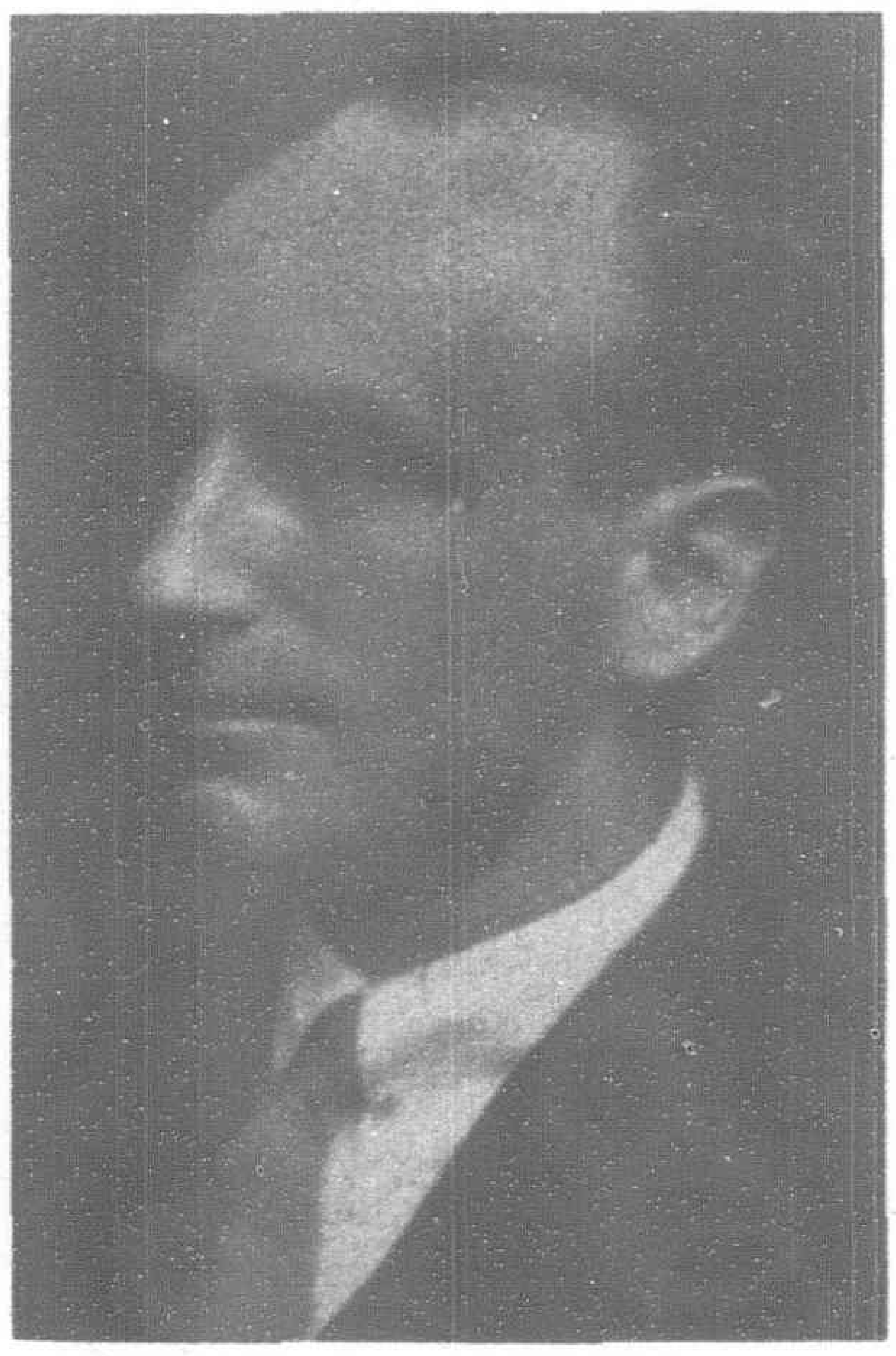
PART III.—WORKS TO INCREASE THE SUPPLY ON THE ISLAND CARRIED OUT SINCE 1920

THE problems connected with the storage and supply of water to Hongkong, and the earlier works involved, have been discussed in two previous contributions. It is now proposed to describe what has happened since there were signs, in 1920, that once again the storage was insufficient to provide an adequate water supply all the year round.

As soon as it was realized that further extensions of sources of supply and storage must be provided, the engineer then in charge of the water department explored the possibilities of the Shing Mun Valley. And, in recent years, arrangements have been made to bring water from that district into Kowloon and thence across the island by a pipe line.

This source of supply is so important to the island of Hongkong that, although it also feeds the Kowloon reservoirs, a description will now be given. The scheme, unfortunately, was not put in hand early enough to avoid severe water famines that occurred years after it might have been completed.

A. B. Purves, M.INST.C.E., **Waterworks Engineer, Hongkong**



R. M. Henderson, M.INST.C.E., M.I.MECH.E., **Director of Public Works, Hongkong**

Delays are Dangerous

The story of water shortage in Hongkong is one that has constantly recurred in its history of the last sixty years. The rapid increase in the number of residents produced many difficult problems, but solutions were offered by local engineers. It was the delay in carrying out the work, caused chiefly by those responsible for the finances of Hongkong, that brought about the recurring water famines.

It must be remembered that in 1841 the population of Hongkong was about 5,000; in 1860 it was 50,000 and it is now nearly a million. (Fig 1). The unforeseen rapid increase in the population, during the past seventy years, made the problem of water shortage frequently a matter of urgency since the first reservoir was built in 1863. Schemes had to be devised and subjected to the criticism, not only of engineers, but to the local Government administrators and the authorities in London.

Owing to the disturbed state of South China, when some of the proposals were under consideration, and because of the heavy cost of the schemes, those in authority hesitated for a long time before approving of big estimates. That delay caused much greater inconvenience and anxiety to Hongkong than had been anticipated, owing to unusual droughts in years when the rainfall was much below the average.

The plan to increase the capacity of the reservoirs in Hongkong by utilizing the Shing Mun Valley supply was suggested by the engineer responsible for water supply in the local Public Works Department some fifteen years ago.

Great praise for the foresight shown, and practical proposals, made, is due to Mr. R. M. Henderson, M.INST.C.E., M.I.MECH.E., etc., He was then in charge of the Waterworks Office and now is the Director of Public Works, Hongkong. (Fig. 2).

He had for years realized the urgency of the problem; he had often recommended that the storage capacity should be increased. He is fully entitled to be called the "Father" of the Shing Mun Valley scheme.

Arriving in Hongkong in 1912, as an Assistant Engineer in the Water Department of the Public Works, he had had considerable experience in that branch of engineering before his arrival in Hongkong. His first practical experience in this part of the world was gained on the construction of the Tytam Tuk reservoir. He afterwards became Executive Engineer in charge of the water supply of Hongkong.

Although, when the Tytam Tuk reservoir was opened in 1917, the Governor, Sir Henry May, stated that the scheme would meet Hongkong's needs for several years, it soon became apparent that the increasing demand for water would soon cause new storage capacity to be considered as a matter of urgency.

The Bold Scheme

Mr. Henderson explored every possible solution of this difficult problem and finally came to the conclusion that the only satisfactory and permanent plan was what is now known as the Shing Mun Valley scheme. He prepared detailed estimates showing that a huge storage capacity could be provided on the mainland, whereas it was impossible in a satisfactory manner to supply the demands from any scheme of storage on the island.

It was obvious that storage on the mainland involved a pipe line across the harbor of at least a mile in length. After Mr. Henderson had prepared his plans, etc., for the Shing Mun scheme, the problems connected with it were submitted to London consulting engineers. They gave a general approval of the main features of the scheme.

When later it became necessary to carry out the details of a very difficult part of the project viz., the building of a big dam across the Shing Mun Valley, a firm of London consulting engineers, Messrs. Binnie, Son and Deacon, were made responsible for the work. That firm has carried out the extensive works connected with the supply of water for Singapore and several other large cities. The work on the dam will be described later. For the present we will consider only the efforts made to link up the Shing Mun Valley supply with Hongkong before the Consulting Engineers mentioned above undertook the design and construction of the dam.

In the early days, when the suggestion to utilize the Shing Mun Valley was first made by Mr. Henderson, the writer visited the district. The boldness of the project and the obvious advantages of an almost indefinite storage from a catchment area, huge as

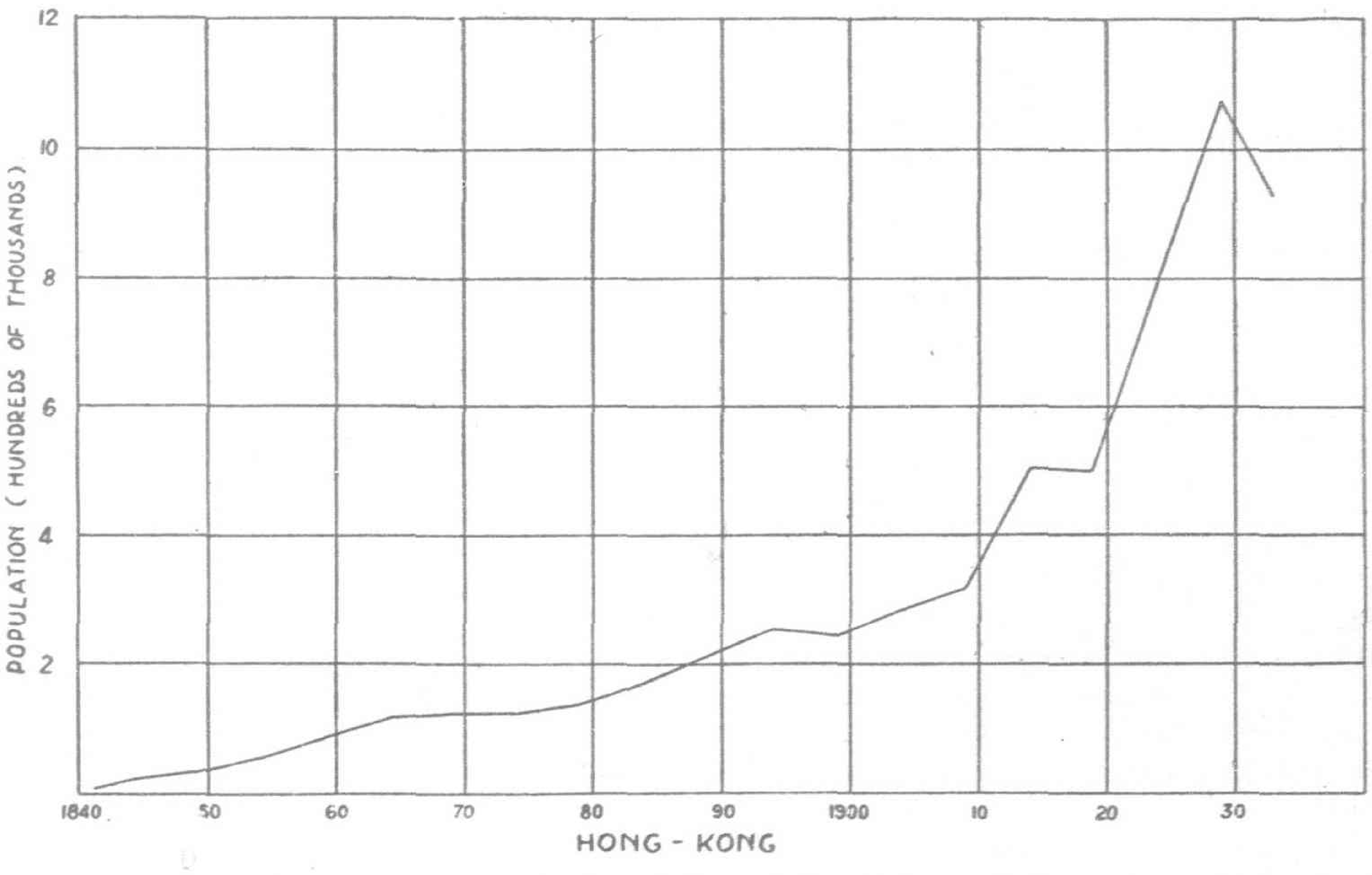


Fig. 1.—Curve showing Increase in Population of the Colony of Hongkong, 1841-1933

compared with that available on the island, made an appeal irresistible to the technical mind. But engineers all over the world have often discovered that what seems to them to be merely commonsense proposals present all sorts of difficulties to administrators.

Watching Expenditure

In that connection the following true story may be related. In the course of conversation with a certain Colonial Secretary in Hongkong —he has now gone the way of all flesh—that official mentioned an improvement that seemed to be most desirable. The writer innocently remarked that, as the Colonial Secretary considered the plan to be excellent, it was surprising that he—the Colonial Secretary—had not initiated that scheme of improvement as it was so obviously needed. " My good fellow " answered the Colonial Secretary " You seem to forget that I am an administrator and that administration never *initiate*. Out job is to *criticize*, to delay, and even to obstruct, the schemes put forward by others. If we did not do so the place would soon be bankrupt. Every Head of a department wants to spend more money than we can possibly allow; experts never seem to realize that their schemes must be financed. Our job is not to initiate schemes, but to conserve the necessary funds. And that is why we obstruct and delay new proposals!"

Of course, it is essential to consider the financial aspects of a scheme in relation to the available revenue or assets of a country or municipality. Engineers must acknowledge that fact. But what is most exasperating to them is delay caused by a refusal to examine proposals and plans put forward for consideration. Money, of course, is often difficult to obtain for really good schemes of development. It is finance that is holding up enormous schemes of engineering work in China to-day.

A Clear Case for Action

The fate of new engineering proposals depends upon the attitude of mind of those who have to finance them. If an official or financier is progressive he helps forward new schemes; if otherwise he has the opportunity to delay them.

Engineers have to spend a great deal of time in elementary explanations concerning schemes, the reasons for which seem to them to be obvious, but which must be made understandable to men who have had no scientific training. It is often exasperating for technical men to have to spend their time in order to convince those who control expenditure that a scheme is essential and sound. But many a sound technical scheme has been delayed, and even "scotched," because the engineer whose duty it was to explain it to the non-technical man has been unable to do so in a clear and simple fashion.

Water for Sanitation

During the past twenty-five years the flush system of sanitation has been gradually introduced into Kowloon and Hongkong. In some cases wells, or streams in neighboring nullahs, are used. In others connection is made to the public water mains. This latter arrangement, as it becomes more general, must take more water from the reservoirs.

For public health reasons it is most desirable that this flush system be extended. The old method of " night soil " coolies, carrying away excrement from each house, is not only inconvenient but it is most unhealthy. It is still general in Hongkong and Kowloon, but it must in time disappear. All over China the "night soil" is used for manuring the land. It is the cause of dysentry, typhoid and other intestinal illness; but in China nothing, not even sewage, is wasted.

It is of interest to remember that only a century ago the water-closet was unheard of in England. How was the night soil disposed? To-day the water closet is installed in all modern dwellings in that country, to the great benefit and convenience of the tenants.

Whether people more frequently take baths—Chinese now demand European style houses and flats with a bathroom—or whether people are more wasteful of water; or whether industries demanding more water are growing up—whatever the cause, the effect is there. More and more water per head of population is used each year.

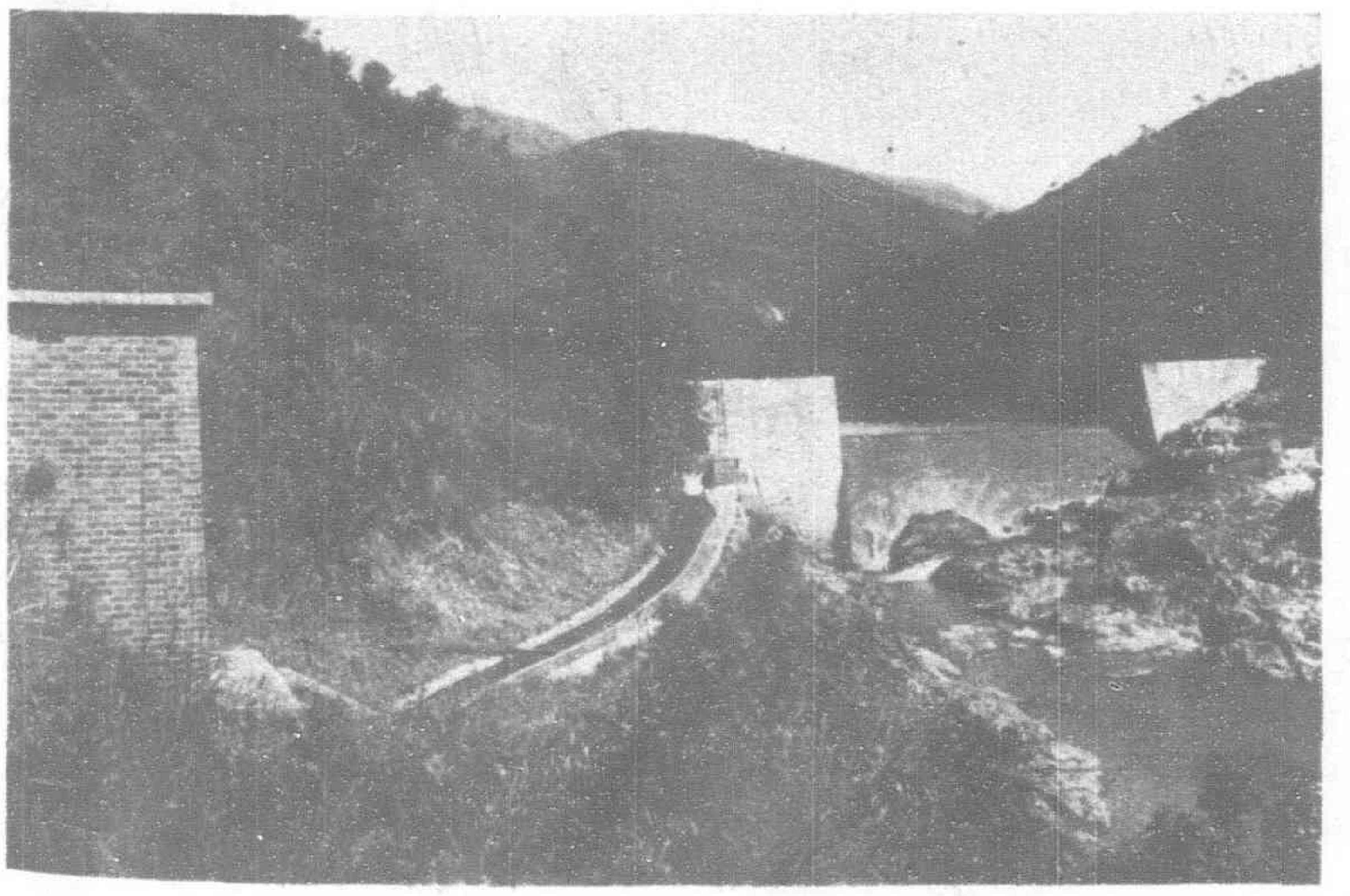


Fig. 4.—The Shing Mun Valley Supply

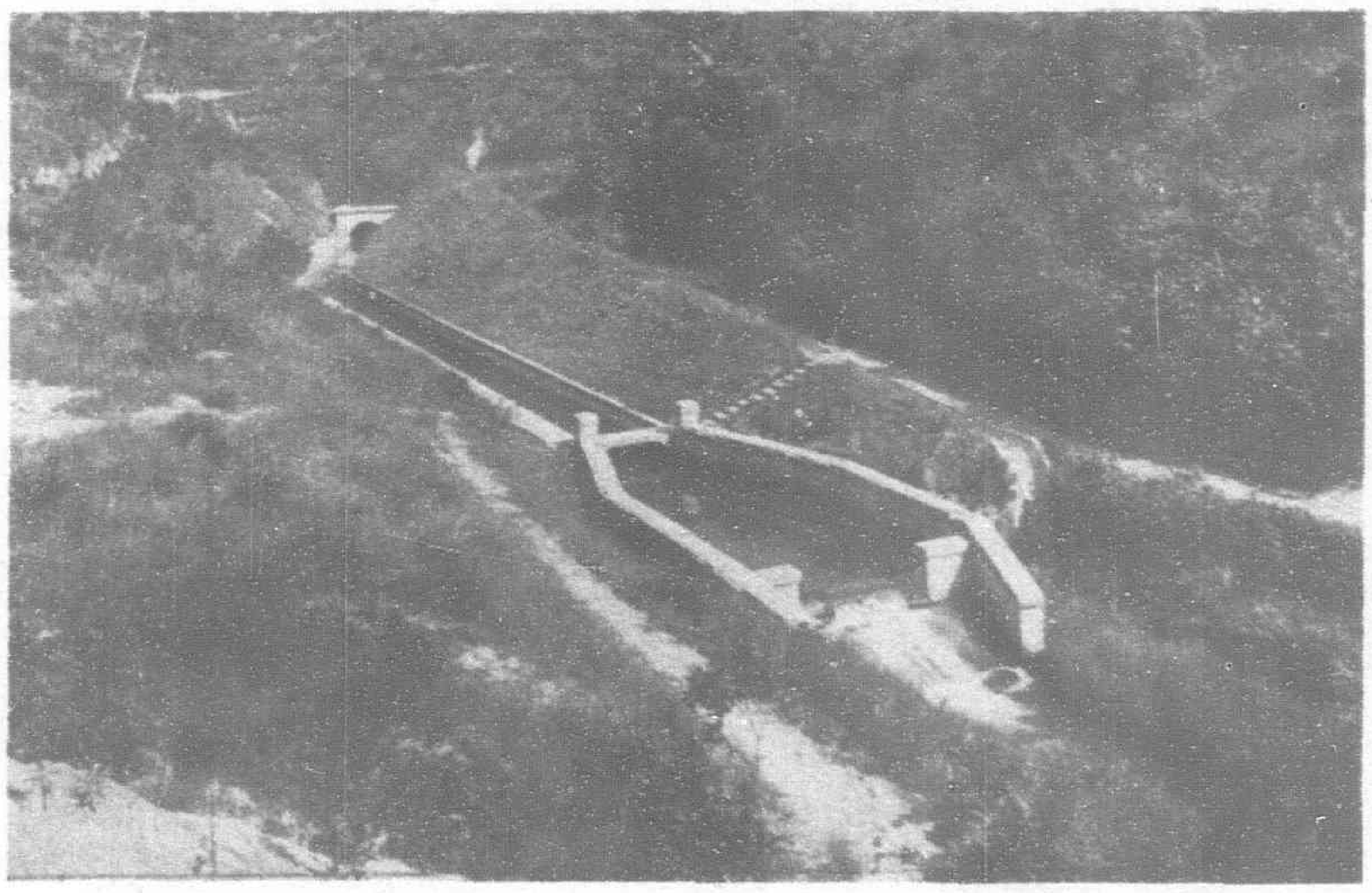


Fig. 5.—Outlet of Golden Hill Tunnel showing Guage Basin in foreground

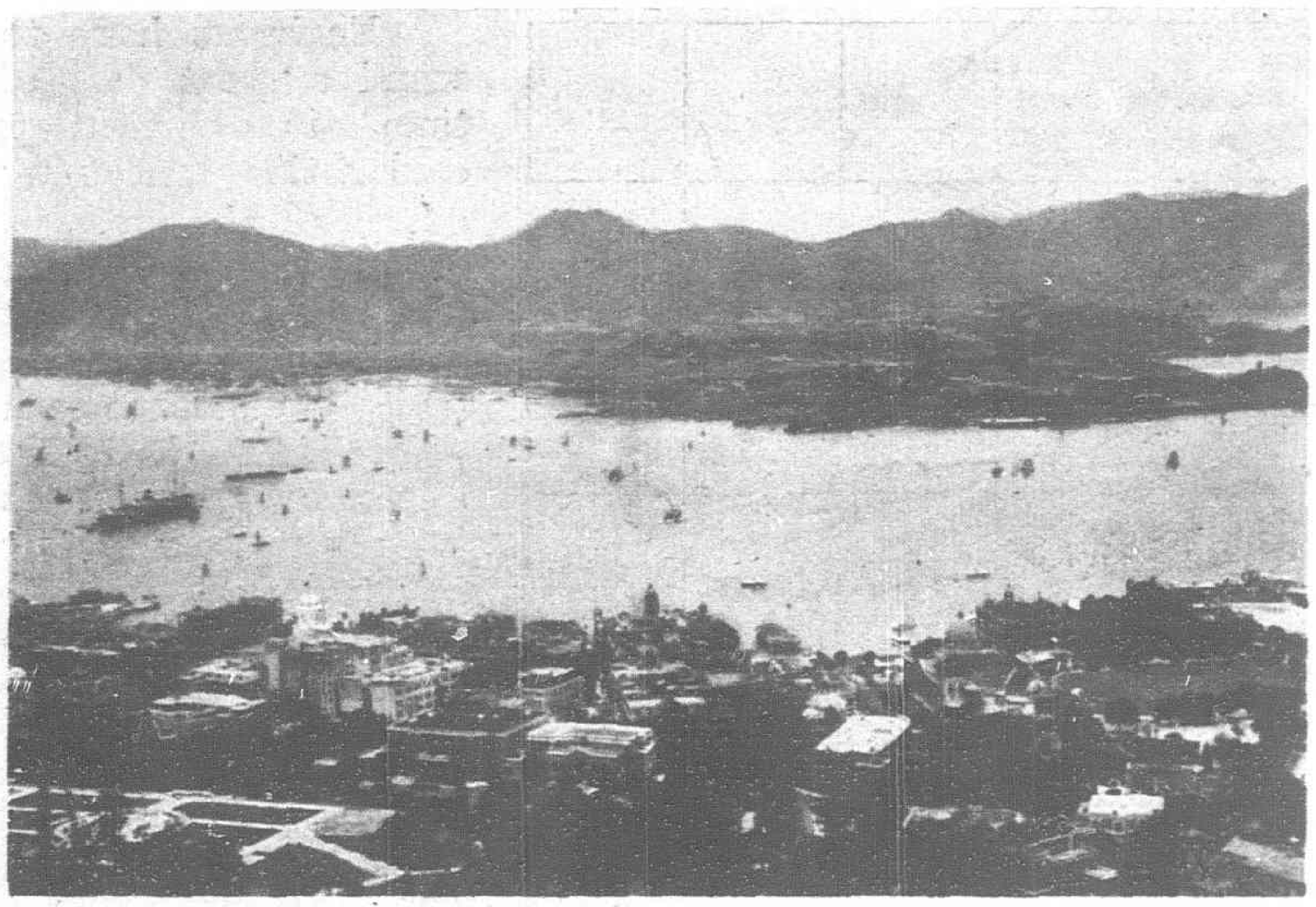


Fig. 6.—Hongkong Harbor—The Route of the Pipe Line

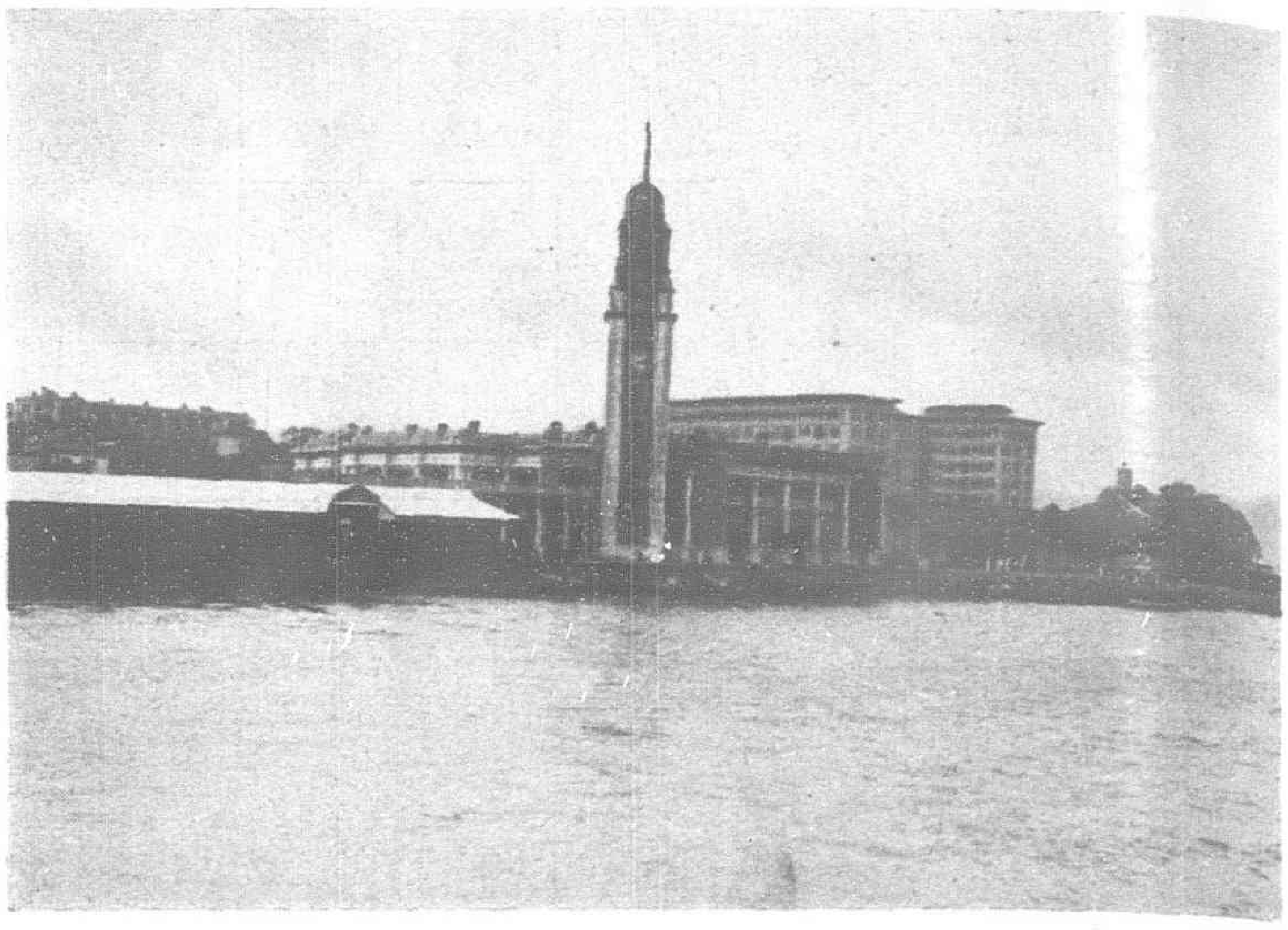


Fig. 7.—Where the Harbor Pipe Line leaves Kowloon

Public Opinion Roused

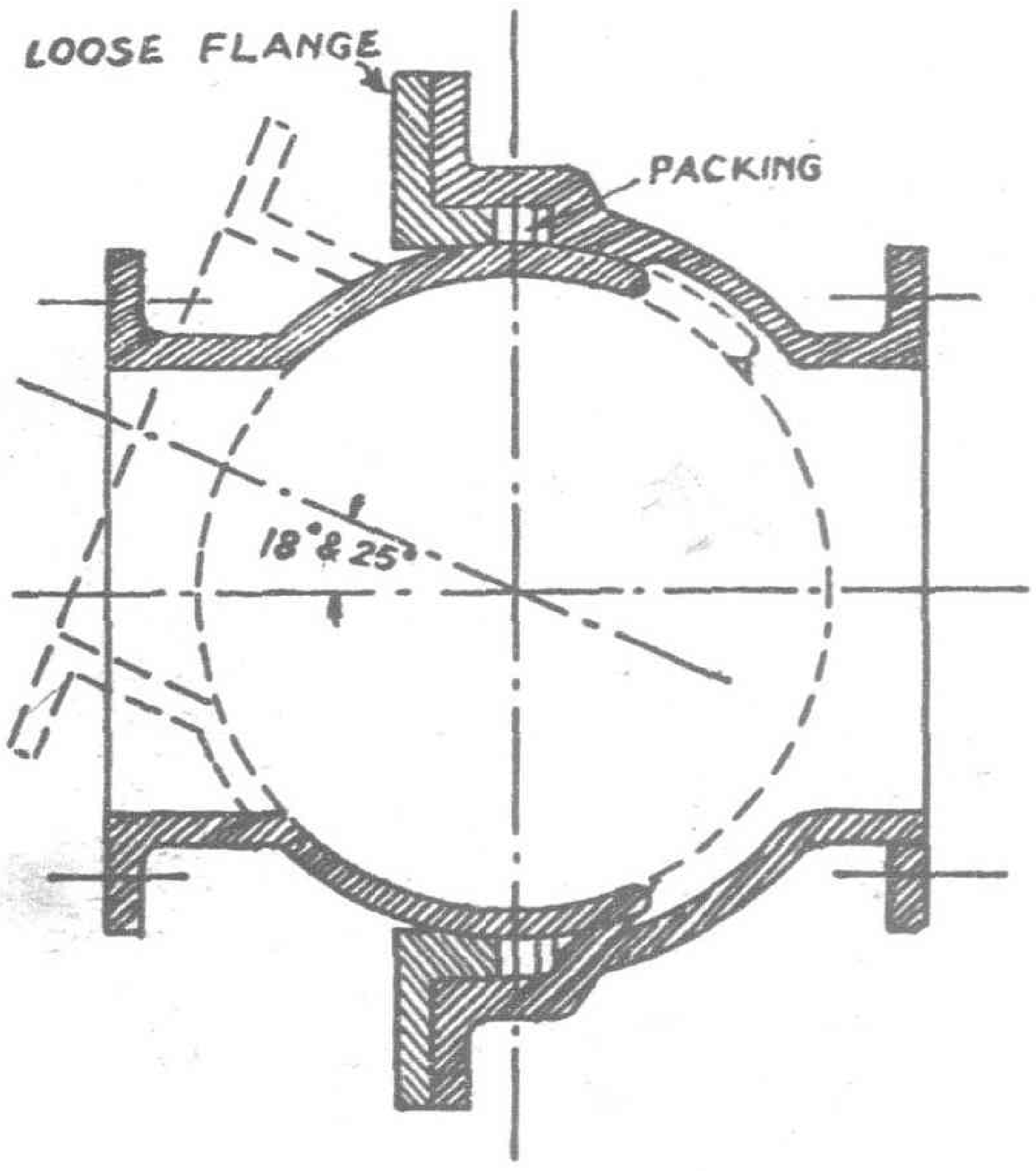


Fig. 8.—Harbor Pipe Line Ball and Socket Joint

Under normal circumstances it is only the technical people who are interested in the details of the water supply for a big city. The ordinary people, who are used to turning on a tap and finding an adequate supply of running water, seldom think about catchment areas, reservoirs, pumping stations, water mains and filter systems; unless, there is a curtailment of the supply, or an outbreak of some epidemic, such as typhoid fever,—and then they suddenly realize their dependence on the efficient working of the water supply system.

In Hongkong the problems connected with this subject have been for years very much in the lime-light. The general public and the newspapers have debated in a vigorous fashion, for years, the details and the many questions connected with that subject.

Thus the general public in Hongkong really do realize the vital importance of a good and constant supply of water. No money that is spent on ensuring that supply is grudged by the taxpayers. In this matter public opinion has usually been in advance of Government action. The only matter for argument recently has been the method, by which the new schemes should be financed.

Naturally enough the present generation of taxpayers think that for such permanent benefits as new reservoirs, etc., future generations should contribute something.

The popular demand has been that all of these new schemes of construction, etc. (they are termed "extraordinary works" in the budget) should be financed by loans.

In actual fact the balances of revenue over expenditure in recent years have been so satisfactory that practically all of the works paid for to date have been financed out of revenue.

As will be explained later, it is calculated that a supply of about 20 million gallons of water per day is required for the island of Hongkong and the adjoining suburb—it might be called city—of Kowloon on the mainland, opposite the island. To provide a constant supply of 20 million gallons a day throughout the dry season demands very complete arrangement for water storage.

At this date (1934) there is, roughly, storage for 3,000 million gallons on the island and mainland—say about five months supply. In 1938 there will be storage of 6,000 million gallons, or say 12 months supply.

But we must remember three important facts (1) the three-year periods of diminished rainfall coming about every 33 years (2) the increasing demand, which may easily increase the total of 20 millions per day to 25 millions with a stationary population and (3) the belief that the population will increase in the future as in the past.

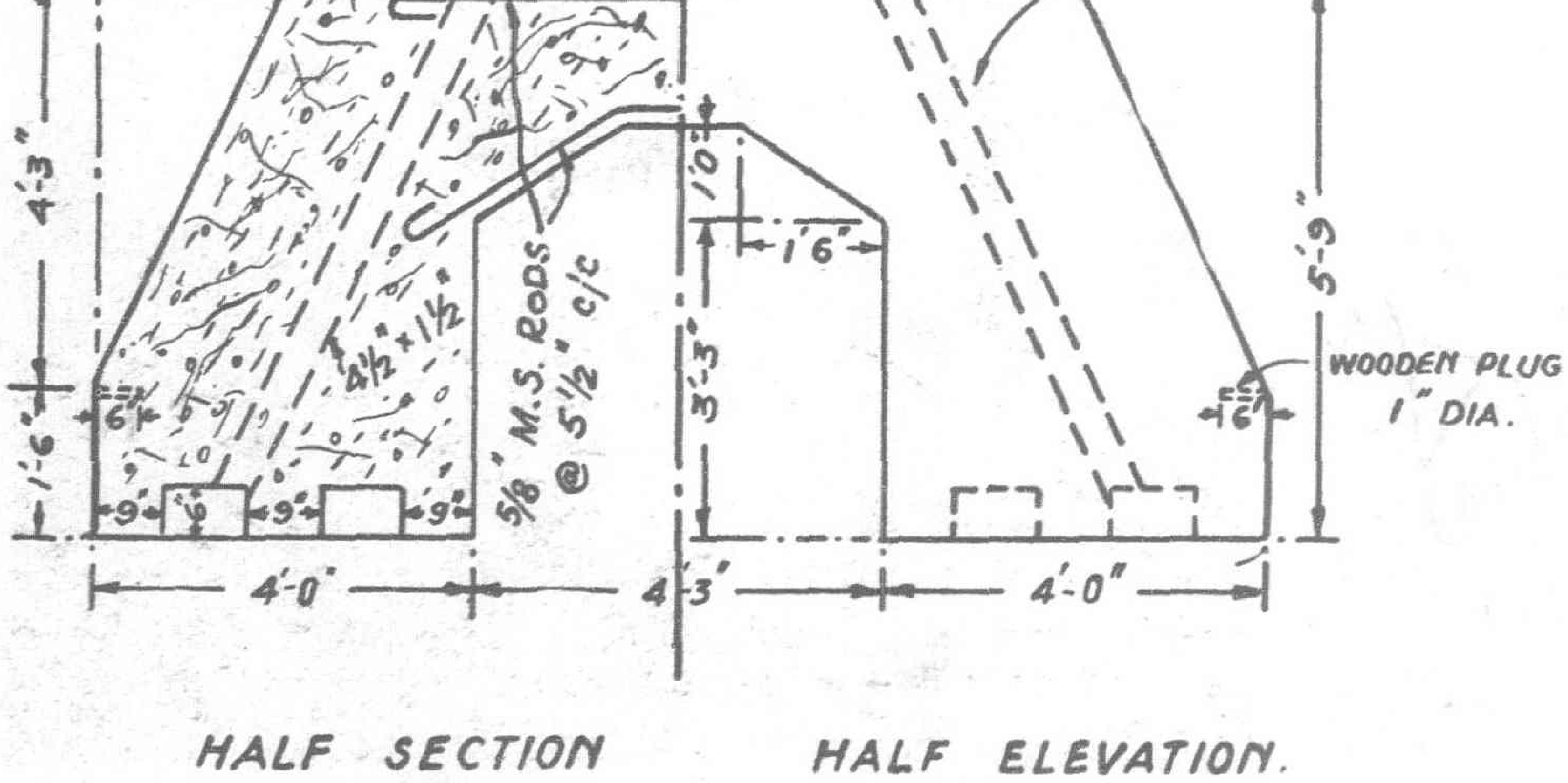


Fig. 9.—Anchor Block for holding Harbor Pipe Line in place on the Ocean Bed

Emergency Measures

The most recent local water famine, the grave shortage of 1929, might have had very serious results, but for the strenuous efforts made in a great emergency. A tribute must be paid of the law abiding citizens of Hongkong. For months the supply for every one was restricted. A large section of the population had no water at all in their houses. They had to obtain it from standpipes in the streets, and water was available at the stand-pipes only during very limited hours.

It is bad enough to be restricted for water in a temperate climate, but Hongkong is situated in the tropics. A water shortage when the thermometer stands round about 85°F to 90°F, day and night, is a calamity. Thousands of the inhabitants on the island of Hongkong in 1929 were compelled to wait long, weary hours in queues under the blazing sun, to take their turn of filling a bucket full of water. The wealthy people sent servants or hired coolies, to stand waiting for a turn. The poor people stood patiently to obtain

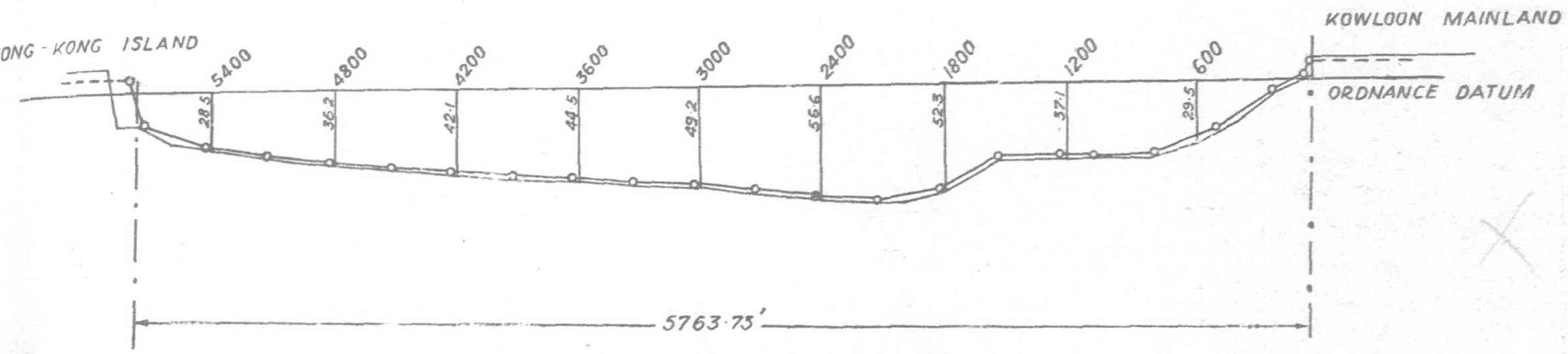


Fig. 10.—Diagram of Harbor Pipe Line

the water necessary for their existence. That went on for months. And it might have been avoided—that was the real pathos of the situation.

Day after day the hoped-for rain failed to appear. When the shortage on the island ran perilously low, ships were chartered to bring water from Amoy, Shanghai, and other ports. No ships leaving the port were allowed to fill up with water in Hongkong. Huge tanks of steel and bricks were erected along the sea-front to hold the water brought from afar by the ships.

These emergency measures were not only exasperating to the populace, they cost a great deal of money—as far as the records of the local Legislative Council inform us, the expenditure was not less than $300,000. It would have been more costly if the rains had been delayed longer, and if the populace had not been very patient under most trying circumstance.

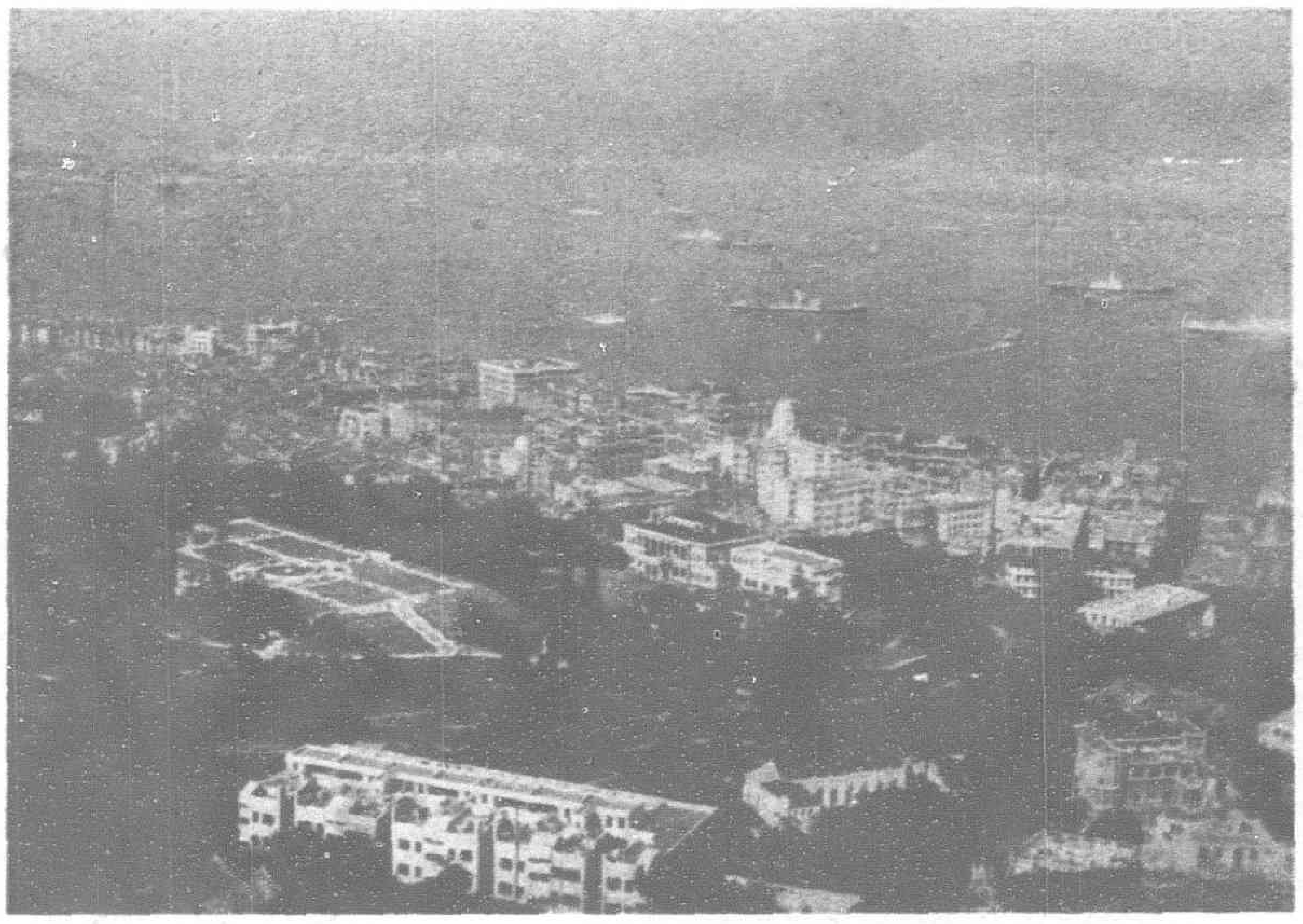


Fig. 11.—Portion of the City of Victoria showing covered Service Reservoir where Harbor Pipe Line delivers water from Tai Mo Shan Area

Warned by Engineers

The crisis was not due to any lack of warning on the part of technical men, for not only were the engineers in Government Service anxious, but other local scientists pointed out the necessity for hurrying on with a proposed new scheme for increasing the storage capacity. On November 10, 1926, Mr. L. Gibbs, M.INST C.E., wrote to the *Hongkong Daily Press*. He reminded his readers of the water famines in the past. That of 1902 was particularly bad, for in that year also, water was brought in ships to the Colony, emergency tanks had been built and the restrictions concerning water supply were severe. After that was heard the cry "Never again"; but in actual fact the crisis was worse in 1929.

Mr. Gibbs was no scaremonger; he was an engineer who had lived for years in Hongkong and who had studied carefully all available data. He had built the Kowloon reservoir. He had watched the figures showing the great increase in the population of Hongkong. He realized that the increase would continue; and he saw, also from the official returns, that as each year went by, the water consumption per head of population continued to rise.

He gave, in his deliberate manner, a grave warning in 1926 with the object of urging rapid work on the new water scheme. "With a rainfall table for the last 40 years before me" he wrote "I venture to predict that within the next five years we shall have in Hongkong a water famine that will remind us of the 'good old times' prior to 1915." The worst water famine in the history of Hongkong took place in less than three years later—in the Summer of 1929.

A False Estimate

The unfortunate political events in South China of 1925 helped to cause a postponement of the projected water supply extensions. It was hoped that the delay would not lead to serious consequences. But it did.

Nature was not kind. The rainfall of 1929 was most disappointing. From July, 1928 to June, 1929, there was the lowest rainfall *ever* recorded in twelve consecutive months, in Hongkong.

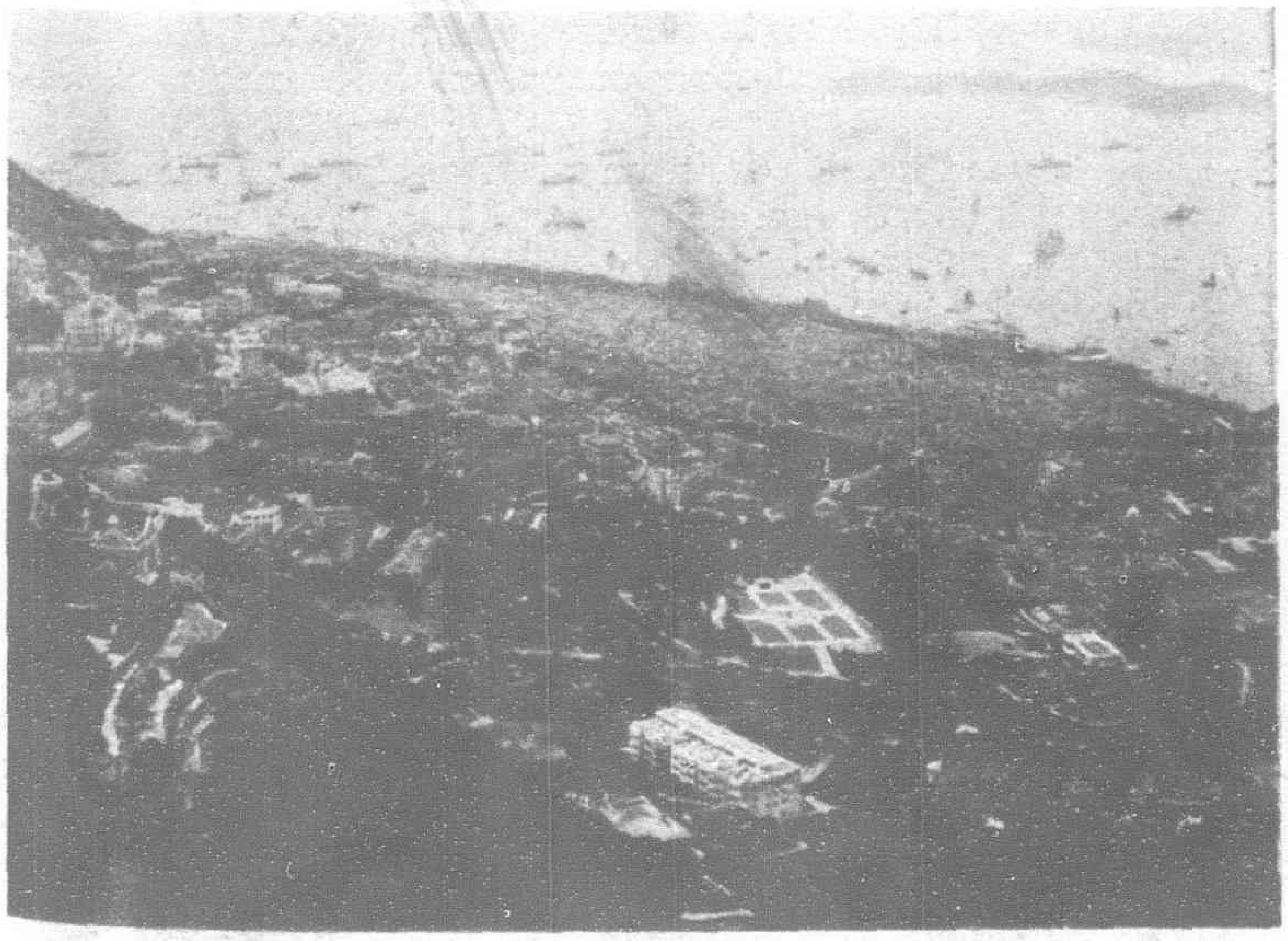


Fig. 12.—City of Victoria showing Top of Covered Service Reservoir in Hongkong Botanical Gardens

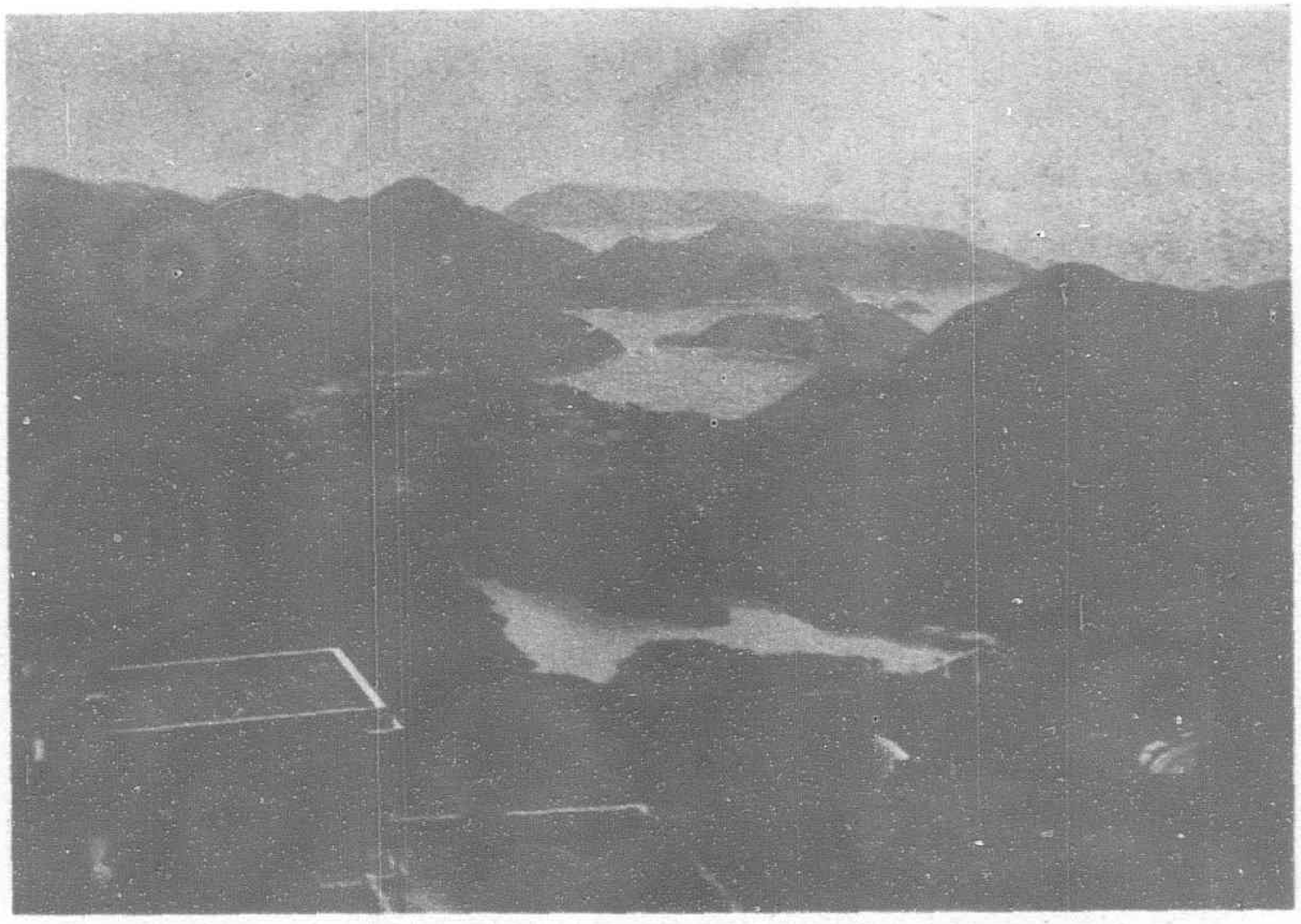


Fig. 12A.—Aberdeen Upper Reservoir seen from The Peak

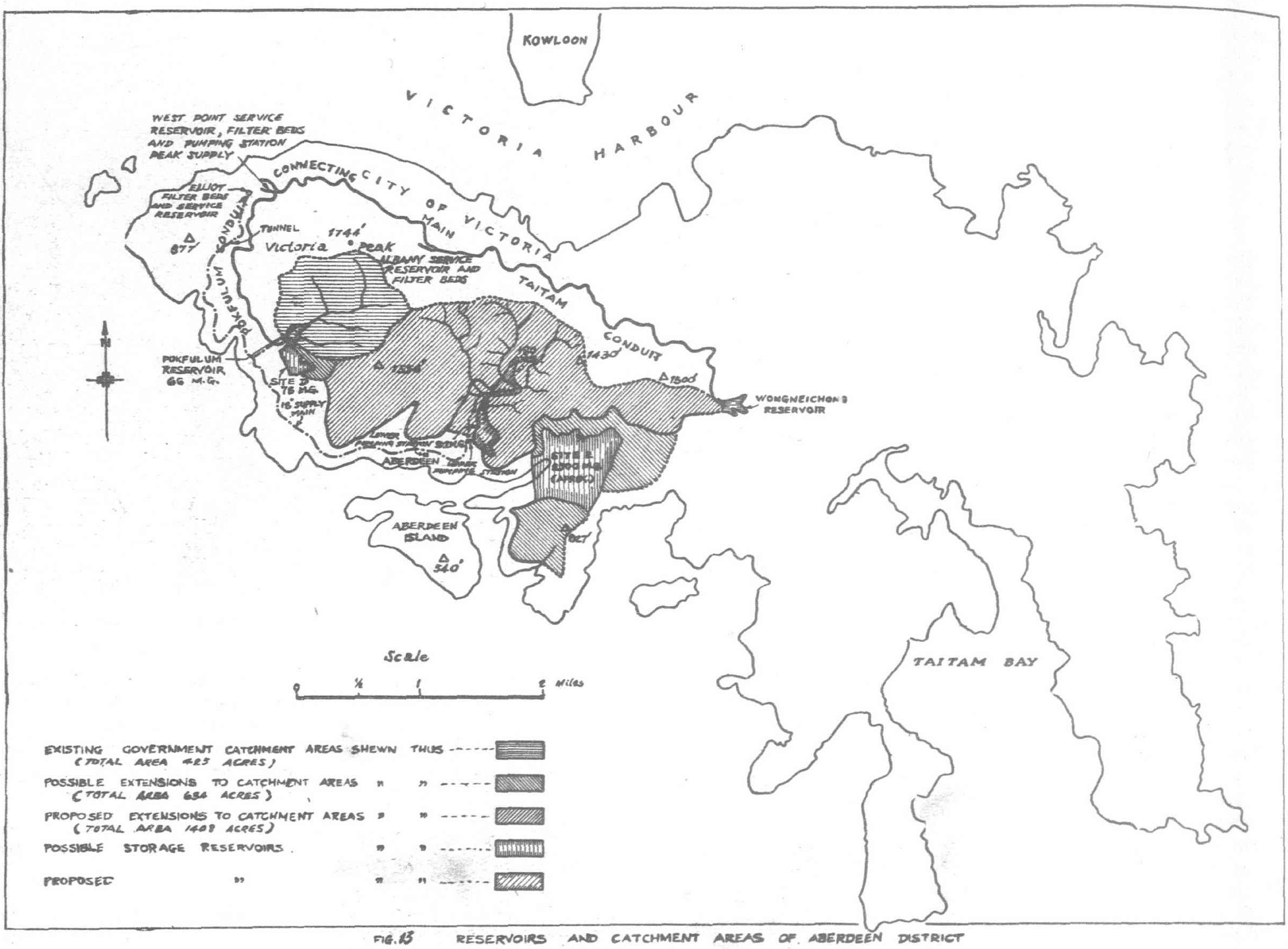

KOWLOON
VICTORIA HARBOUR
WEST POINT SERVICE RESERVOIR, FILTER BEDS AND PUMPING STATION PEAK SUPPLY
CONNECTING
CITY OF VICTORIA
MAIN
ELLIOT FILTER BEDS AND SERVICE RESERVOIR
877'
POKFULUM CONDUIT
TUNNEL
1744'
Victoria Peak
ALBANY SERVICE RESERVOIR AND FILTER BEDS
TAITAM
CONDUIT
1430'
1500'
POKFULUM RESERVOIR 66 M.G.
SITE D 75 M.G.
18" SUPPLY MAIN
LOWER PUMPING STATION BLDG.
ABERDEEN
PUMPING STATION
SITE E
WONGNEICHONG RESERVOIR
ABERDEEN ISLAND
540'
TAITAM BAY
N
Scale
0
½
1
2 Miles
EXISTING GOVERNMENT CATCHMENT AREAS SHEWN THUS (TOTAL AREA 425 ACRES)
POSSIBLE EXTENSIONS TO CATCHMENT AREAS " " (TOTAL AREA 634 ACRES)
PROPOSED EXTENSIONS TO CATCHMENT AREAS " " (TOTAL AREA 1408 ACRES)
POSSIBLE STORAGE RESERVOIRS " "
PROPOSED " " "

FIG. 13 RESERVOIRS AND CATCHMENT AREAS OF ABERDEEN DISTRICT

It was only 37.27 inches, against an average for that period of 84 inches. There was therefore a shortage of 44 inches. For 72 days, from November 15, 1928 to January 25, 1929, there was no rainfall at all; and on many occasions there were periods of absolute drought for six days or more. The tantalizing fact was that, if work had been carried out at Shing Mun such as Mr. Henderson had recommended, much of the trouble would have been avoided.

The Shing Mun Valley Scheme

It was 1920 that the first general proposals to consider Shing Mun Valley were made and Mr. Henderson, and his assistant engineer Mr. A. B. Purves (Fig 3), began to collect data. At that date Mr. Henderson was the Waterworks engineer and Mr. Purves his chief assistant. Since then they have both been promoted and Mr. Henderson is now Director of Public Works and Mr. Purves is the engineer in charge of the Waterworks, excepting the dam construction at Shing Mun Valley. Their investigation in 1920 led to adoption of the general suggestion that the district should be made a source of supply.

We can divide the Shing Mun Valley scheme into three periods.

There was, first of all, the preliminary survey of the district and a general plan for the utilization of the large catchment area, with data to show that it would provide supply and storage for Hongkong and Kowloon even if the total population reached many more than a million. Estimates for carrying out the complete scheme by instalments were provided. This preliminary work was carried out by the Hongkong P.W.D. engineers. It was realized that a great deal more data concerning the formation of the ground would have to be provided before detailed estimates of some of the works suggested could be given.

It was in April, 1924, that all of this work was summarized in a comprehensive report, with estimates, which was forwarded by the engineers of the P.W.D. to the Hongkong Government. It outlined in detail the various sections of these bold and expensive proposals. That report is of great interest.

It can be stated that it consisted of five sections. The first three sections envisaged a gravity supply from a large catchment area which includes the Shing Mun Valley. It was estimated that, when complete, these three sections would provide a minimum daily yield of 11 million gallons.

Included in these sections were aqueducts, tunnels, enormous reservoirs, pipe lines, filtration plant, access roads, etc. Although modifications have since been made the main ideas have been or are being carried out.

The first section (of the 1924 scheme) was to deal with the normal flow of the Shing Mun River which was to be diverted and carried to the Kowloon reservoir, a total distance of about 3.4 miles.

The second section recommended the construction of three impounding reservoirs in the upper Shing Mun Valley, to hold about 2,000 million gallons.

The third section involved a large catch water, draining 2,575 acres of the Southern face of Tai Mo Shan hill, and discharging into the Shing Mun Valley. Two storage reservoirs near Tsun Lung, with an aggregated capacity of 340 million gallons would be made in order to control the floodwater discharge in the catch water.

These three sections therefore, when complete, would provide storage of 2,340 million gallons and also utilize the millions of gallons obtainable from the Shing Mun River.

The fourth section included new catch waters, two storage reservoirs having an aggregate capacity of 2,100 million gallons, and a pumping station. That may come later but is not contemplated at present.

Finally we come to the fifth section which the proposers of the scheme (in 1924) thought "a very doubtful one and may never materialize." The general idea was to build a large dam across the estuary to the sea at a place called Gin Drinker's Bay. There

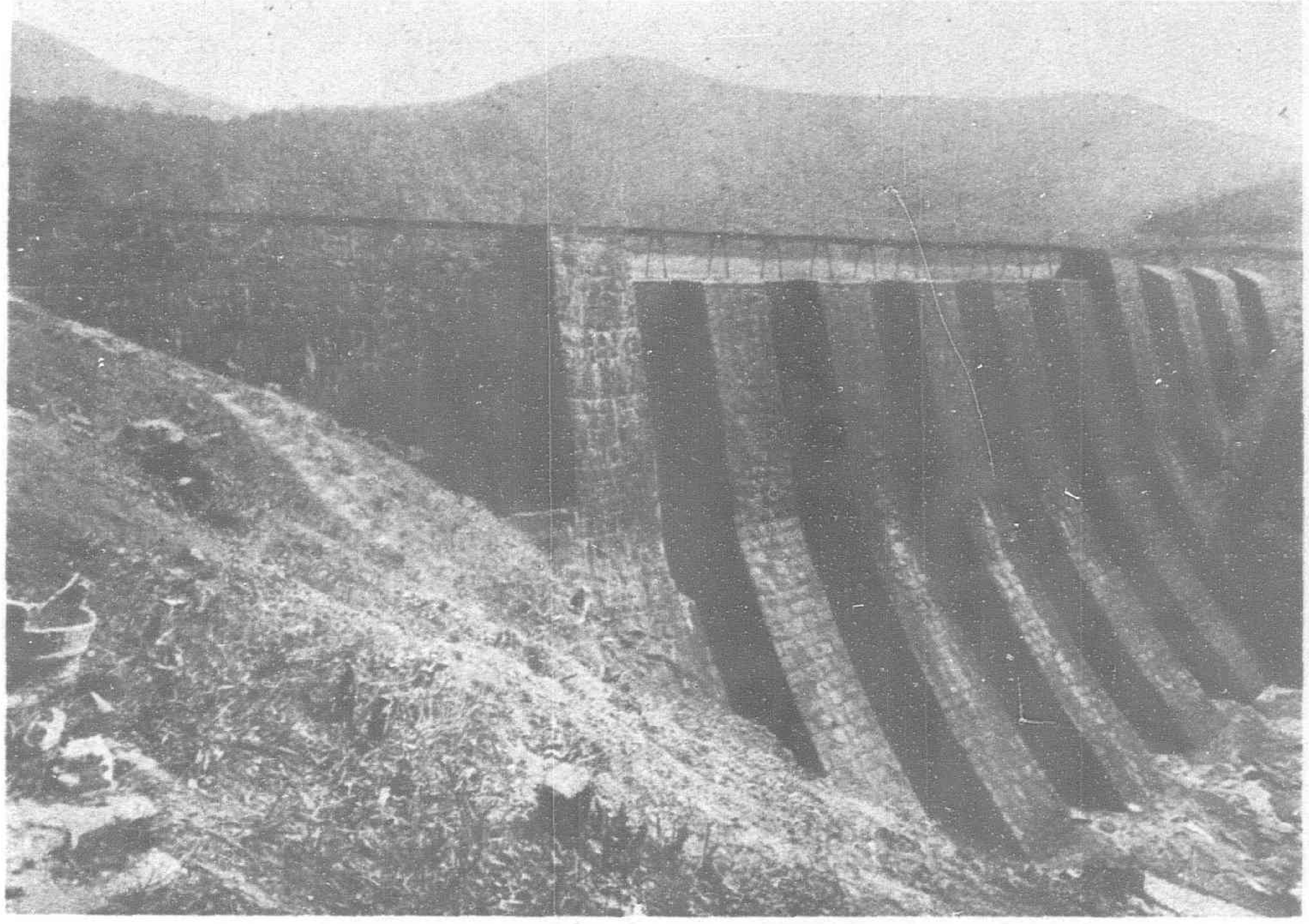


Fig. 14.—The Old Dam for the Aberdeen Paper Mill Reservoir, Hongkong Island

would be pumps and mains to deliver water into the South Channel.

It was estimated that this scheme would yield five million gallons daily, in addition to the 17 millions already alluded to. Thus, the completion of the five schemes would reinforce the existing supply by 32 million daily.

Tunnels and Catch Waters

That planning was the first stage. Then came the next stage the actual work done during 1924-26. That consisted of building a comparatively small dam and many miles of catch water channels, including two lengthy stretches of tunnelling through hills, to carry the water from the Shing Mun River to the Kowloon reservoirs. It was essential to obtain data, as accurate as possible, concerning the quantity of water that runs down the Shing Mun Valley at different periods of the year. Fig (4) shows a portion of the valley and the notch used for obtaining the flow of the stream. These sections were planned and supervised by the Hongkong Public Works Department, although well known British and Chinese contractors were also employed. The outlet from one of these tunnels (the one through Golden Hill) is shown in Fig. (5) which also shows the gauge basin in the foreground. This basin enables the quantity of water to be measured as it passes over the weir and on to the Kowloon storage reservoir.

The third stage is that now being carried out by the London Consulting Engineers viz. the building of the big dam. They assumed responsibility in 1932 and hope to complete the work in 1937.

The work done in the second stage was practically all concerned with the mainland.

The water from Shing Mun Valley goes to supply Kowloon and will be described in detail in the next article, descriptive of the Kowloon supply. But it affected the supply to the island as a pipe line was laid from the Kowloon reservoir, to the Botanical Gardens in Hongkong. And that section of the work will now be discussed.

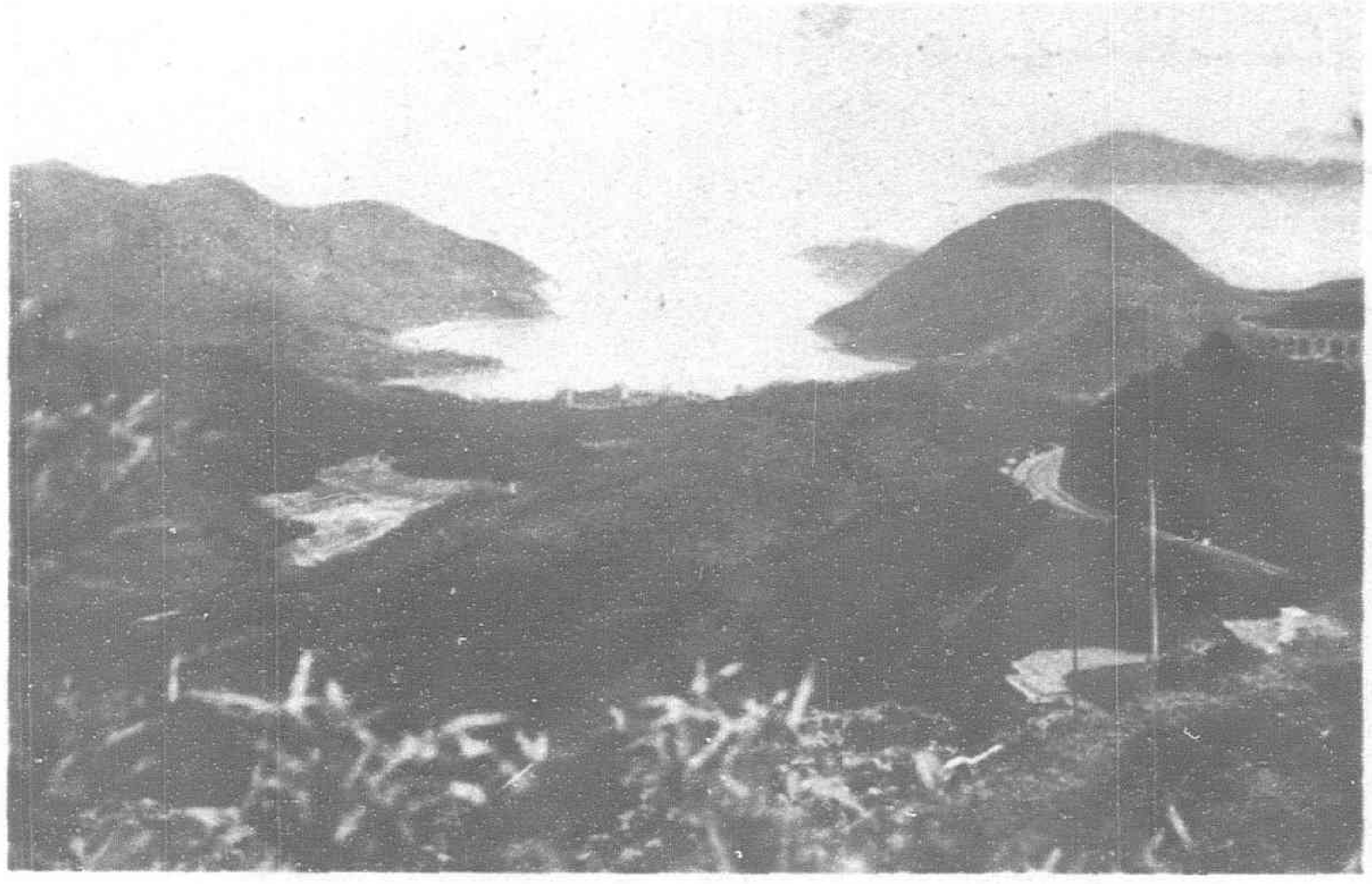


Fig. 15.—The Aberdeen Lower Reservoir Empty

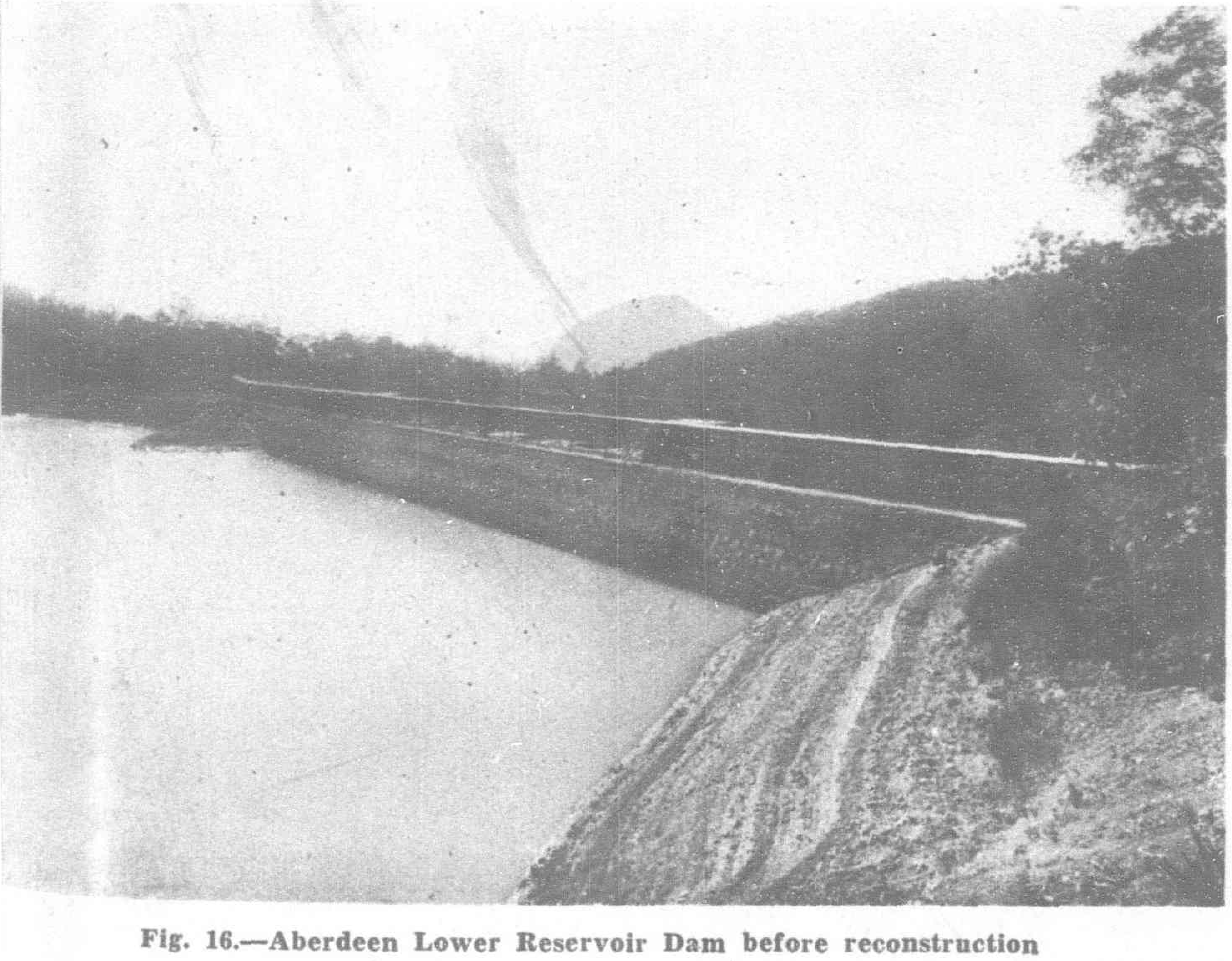


Fig. 16.—Aberdeen Lower Reservoir Dam before reconstruction

The Pipe Line Across the Harbor

When in 1922 that the proposal to supplement the supply for the island by water from the Shing Mun Valley was first put before the local Government, a most urgent, and important, section of that scheme was a pipe line across the harbor.

But the suggestion to lay a pipe upon the bed of the harbor created considerable opposition. All sorts of difficulties and dangers were suggested. There was delay, but at last the work was carried out. The pipe line has supplied, on an average two million gallons of water daily to the island for some years since 1930. None of the dangers suggested by the opponents of the scheme have been encountered.

The then Assistant Director of Public Works, Hongkong, Mr. R. M. Henderson, M.INST.C.E., responsible to the Director of Public Works for the Water Department, contributed an interesting article to the June, 1930, issue of the *Hongkong University Engineering Journal*, giving details of pipe line. Much of the following information is obtained from that source.

When the proposal was first made the engineers of the Water Department in Hongkong were very fully occupied. Definite information about technical details was difficult to obtain in Hongkong. The matter was therefore referred to Consulting Engineers in England. In due course they formulated a complete scheme.

They enlarged upon the original proposals. They recommended that two 18 inch diameter lap welded steel pipes should be laid in a dredged trench and then surrounded with concrete.

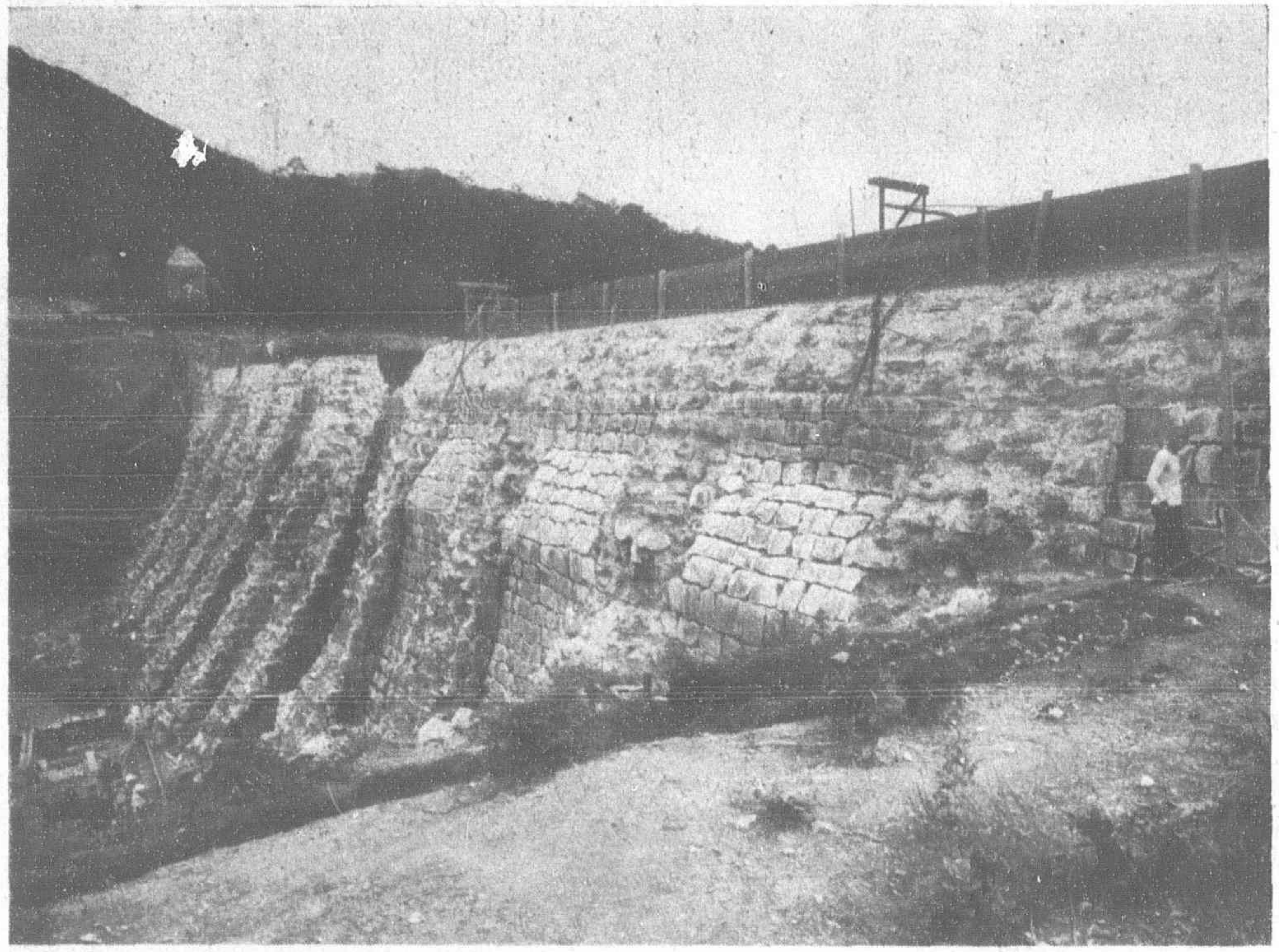


Fig. 17.—Aberdeen Lower Reservoir Dam in course of reconstruction

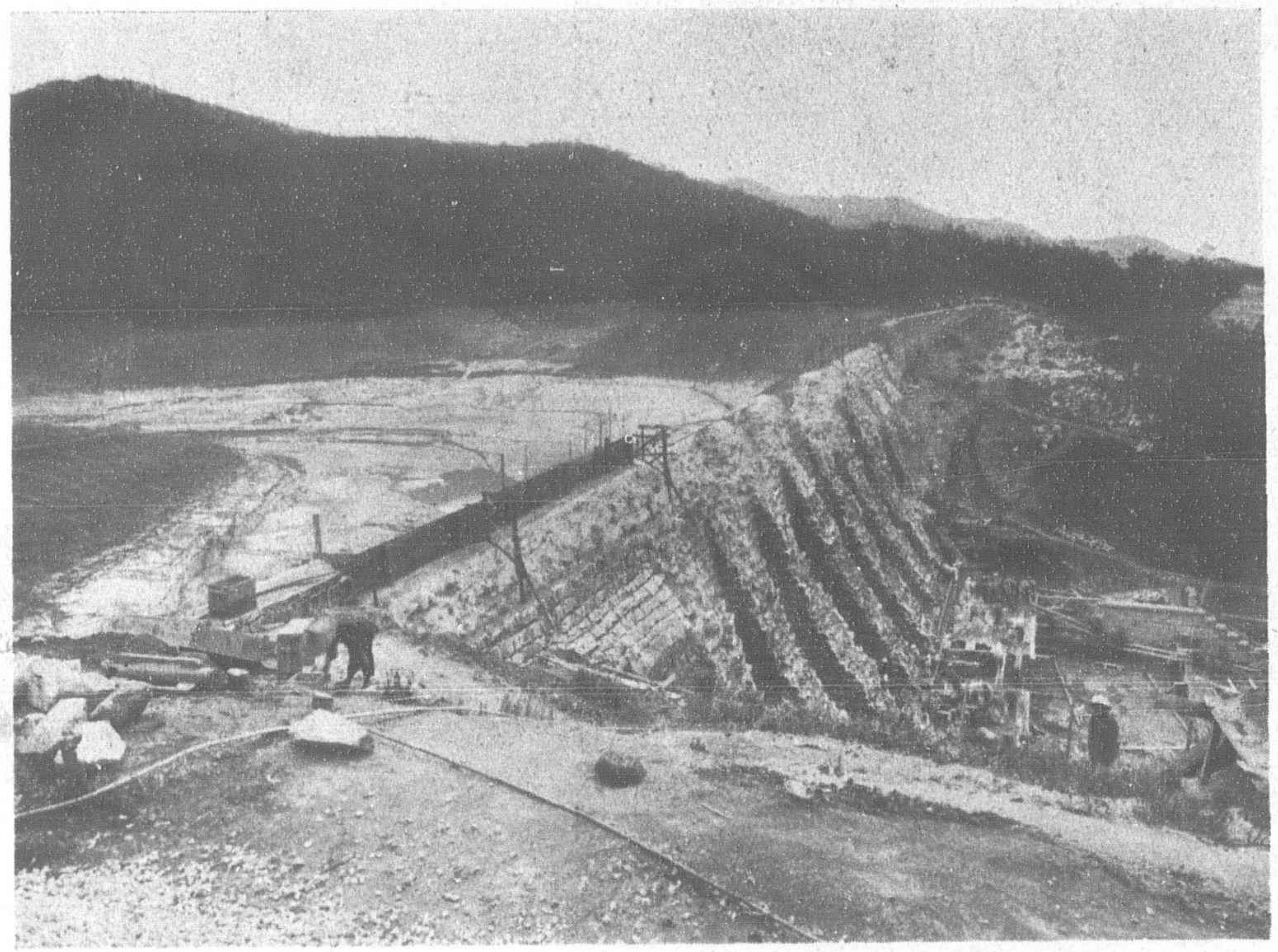


Fig. 18.—Reconstruction of a Reservoir on Hongkong Island

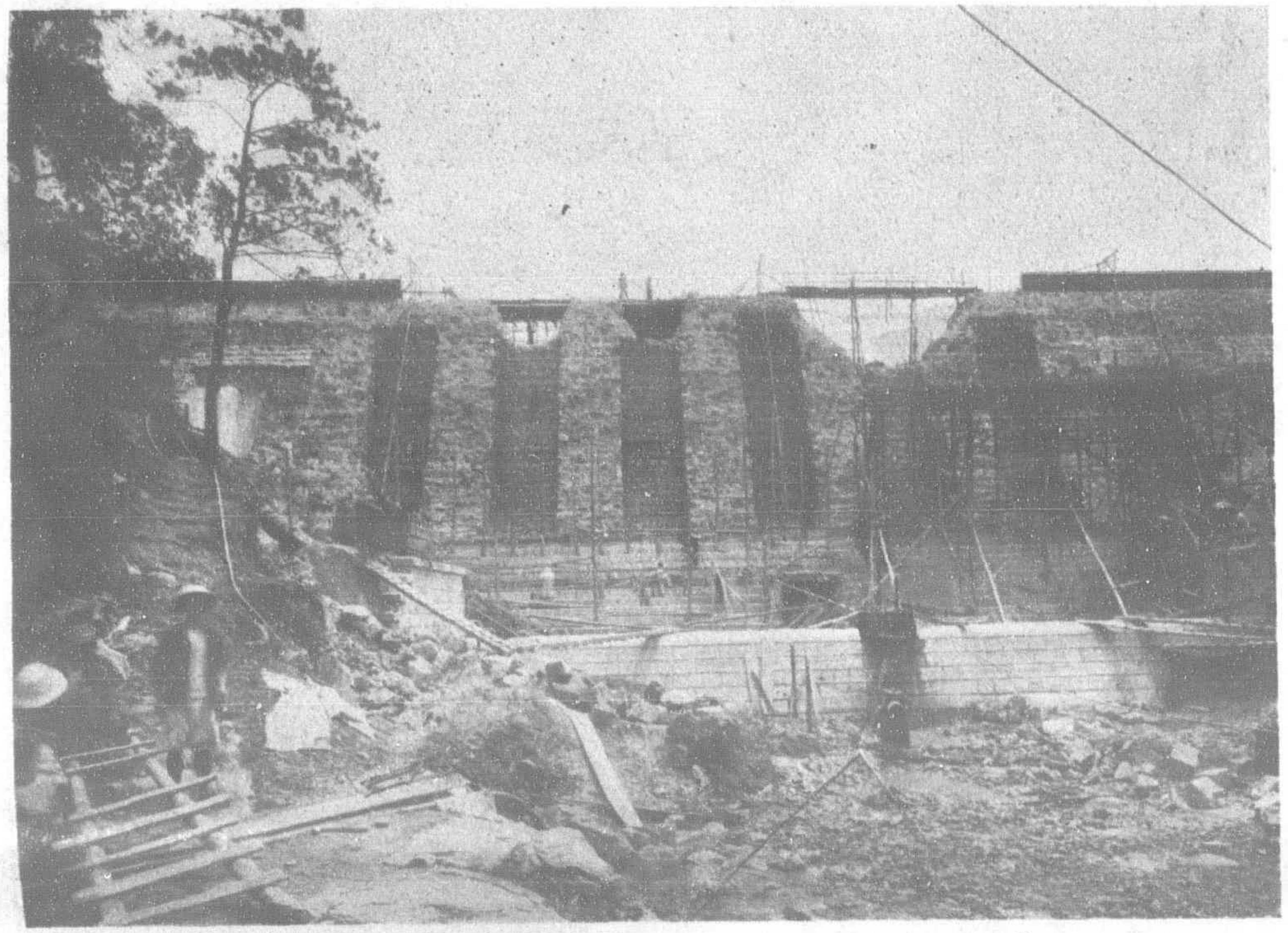


Fig. 19.—Aberdeen Lower Dam in course of reconstruction

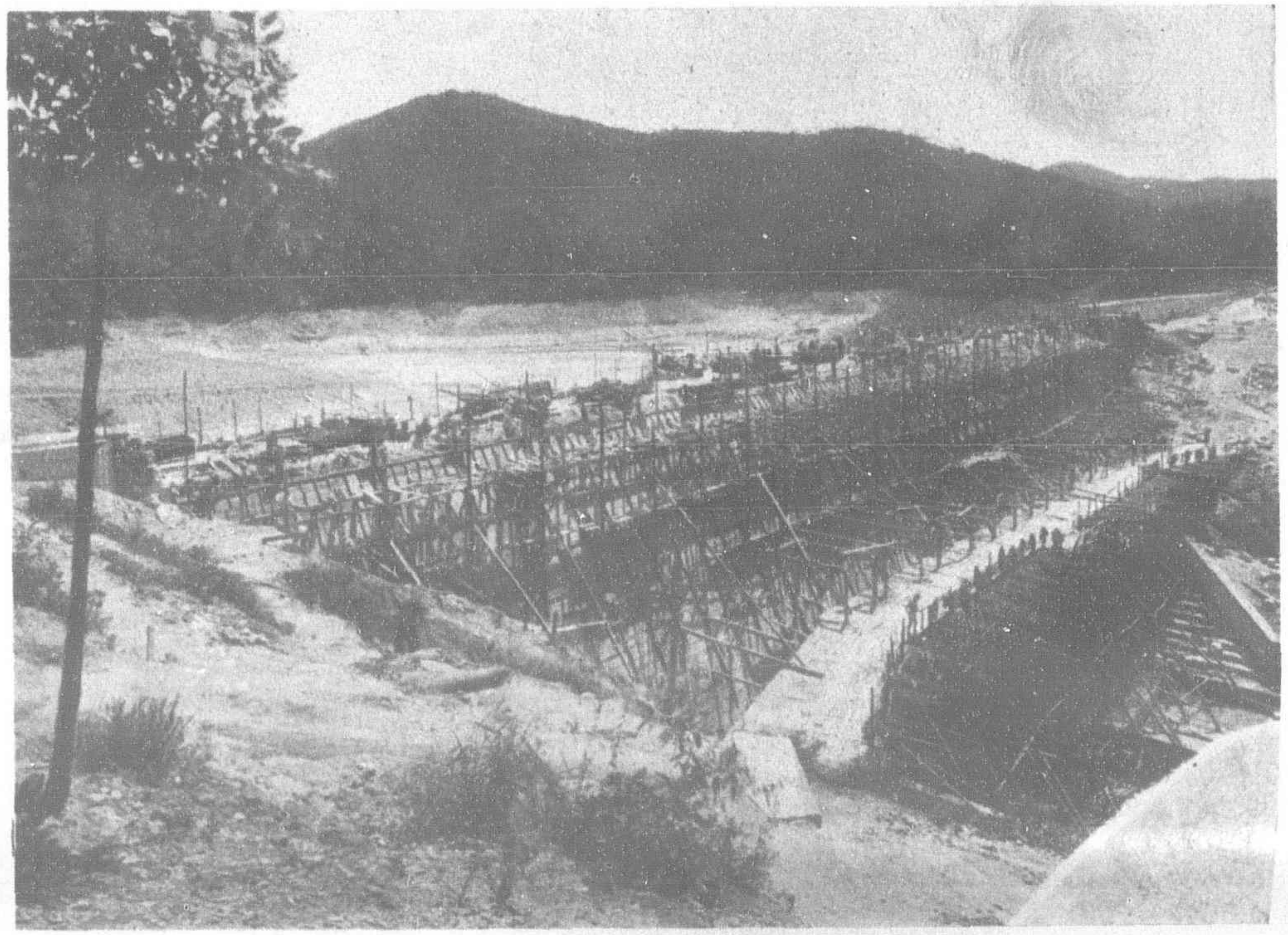


Fig. 20.—Placing Concrete Blocks in position

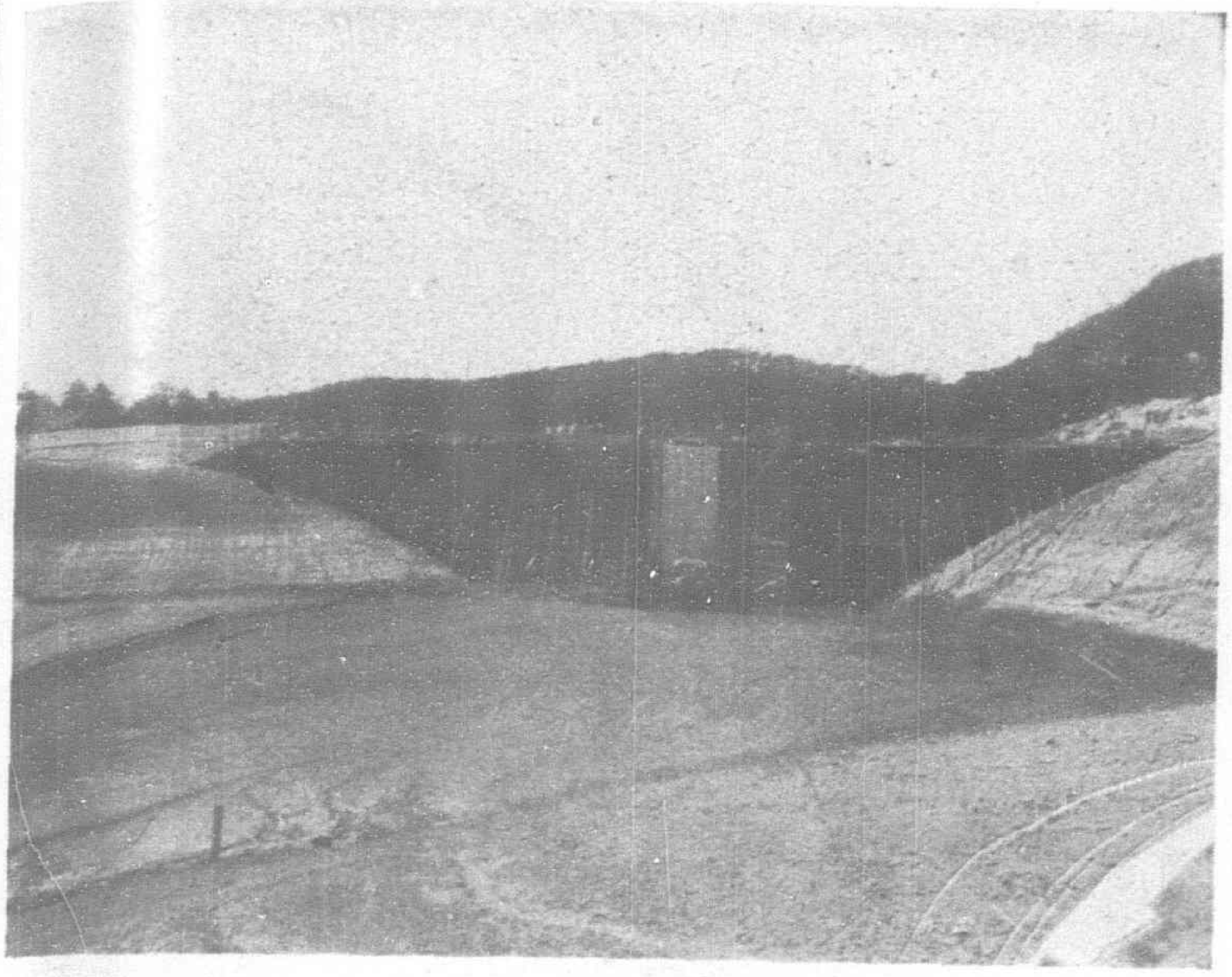


Fig. 21.—Aberdeen Lower Reservoir Empty for Dam Repair and Removal of Silt

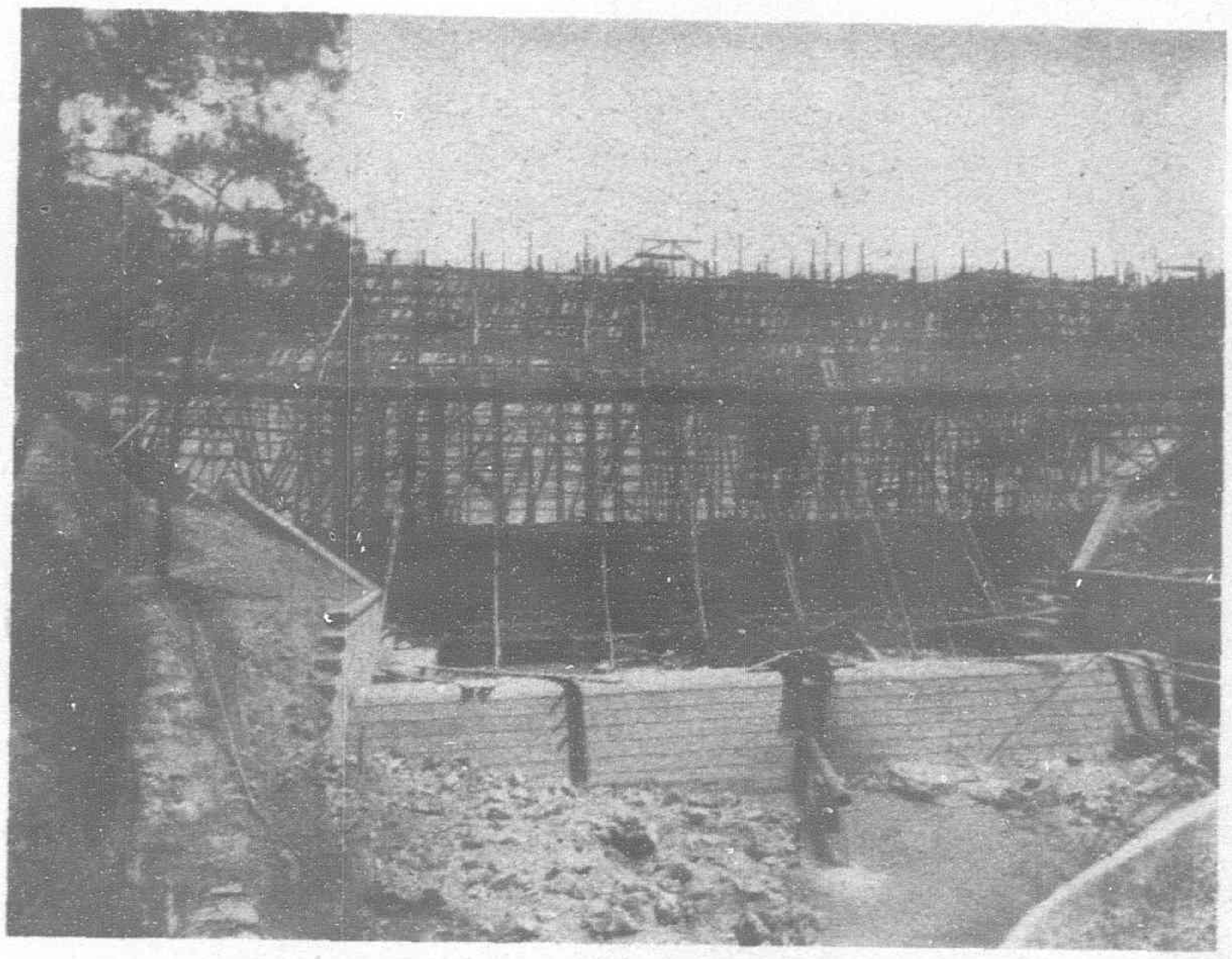


Fig. 22.—China Fir and Bamboo Scaffolding used during Repair of Aberdeen Reservoir

The cost of this complete scheme was estimated at £200,000, or at the then rate of exchange, some two million dollars, Hongkong currency.

At the time the finances of the Colony did not seem to warrant such a large expenditure. Moreover the scheme was known to be larger than was necessary for immediate requirements. For these, and other reasons, it was decided to postpone action.

Nature, however, intervened. There came a shortage of water. It became apparent, not only that a pipe line across the harbor was needed, but that it was urgently required. It was therefore decided to attempt to carry out the original proposals. And to-day there is a 12 inch lapwelded steel pipe on the bed of the harbor. The route of this pipe line is shown in Fig. 6, and Fig. 7 shows where the harbor pipe line leaves Kowloon.

Lapwelded steel pipes $\frac{7}{16}$ inch thick and 12.265 inches internal diameter were delivered to Hongkong in lengths of about twenty feet and with sockets and spigots for long sleeve welded joints. Certain pipes, about 1 in 4, similar to those mentioned above, had also spigot and flange and socket and flange ends.

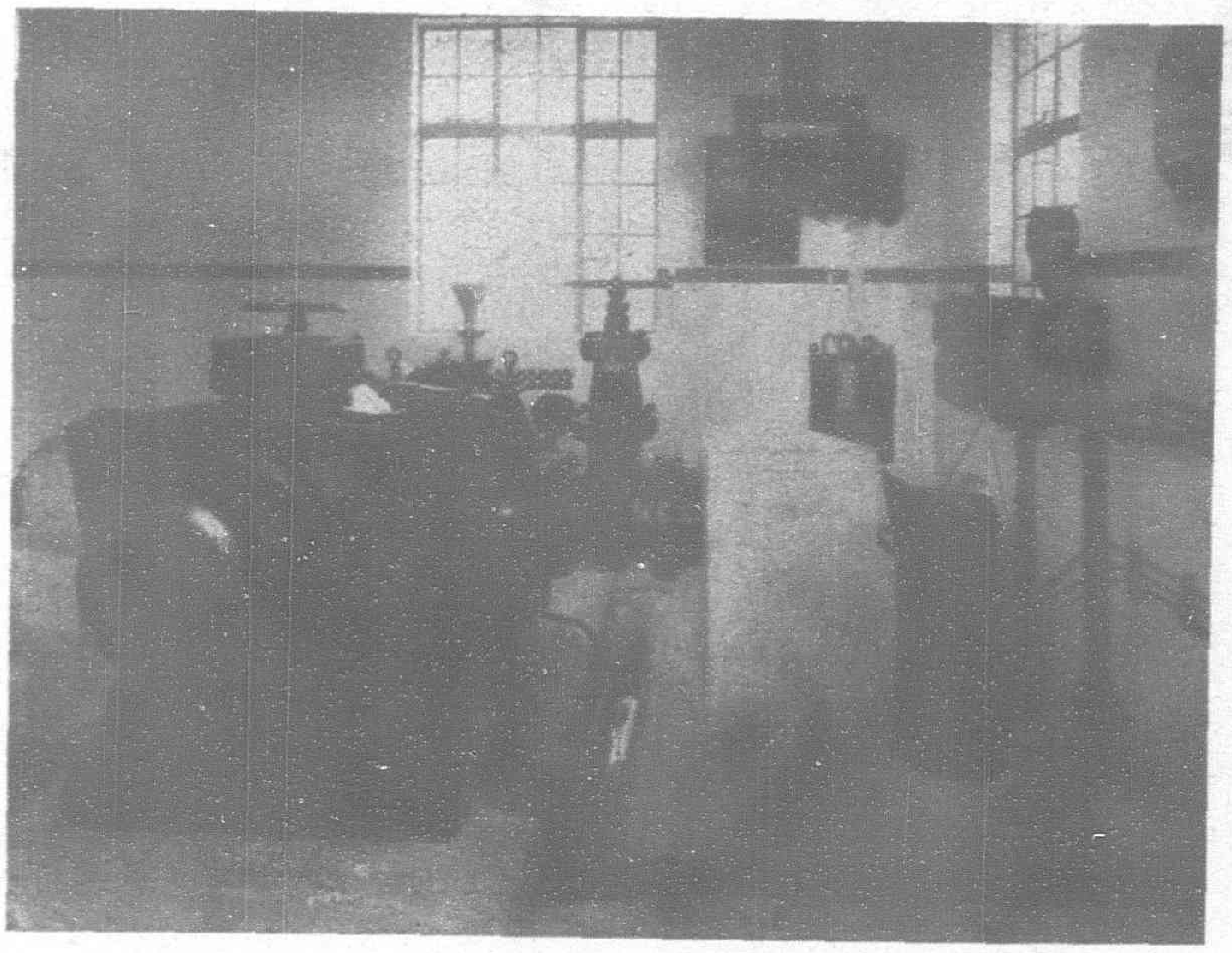


Fig. 23.—The Aberdeen Pumping Station

The twenty feet pipes were welded in Hongkong, in the assembly yard on the Praya East Sea Wall, into sections of approximately 100 feet long.

The distance across the harbor where the pipe is laid is approximately 5,700 feet so that 57 of these 100 feet lengths had to be built up.

In order to take up the change in line and level of the pipe, due to the variation in the ocean bed, flanged steel and socket joints were used, one joint being attached to every third hundred foot section (Fig. 8).

Special expansion joints were used for every 600 feet length of pipe to take up any expansion or contraction due either to change of temperature or to any settlement of the pipe in the ocean bed.

The path of the pipe on the harbor bottom was lined out by

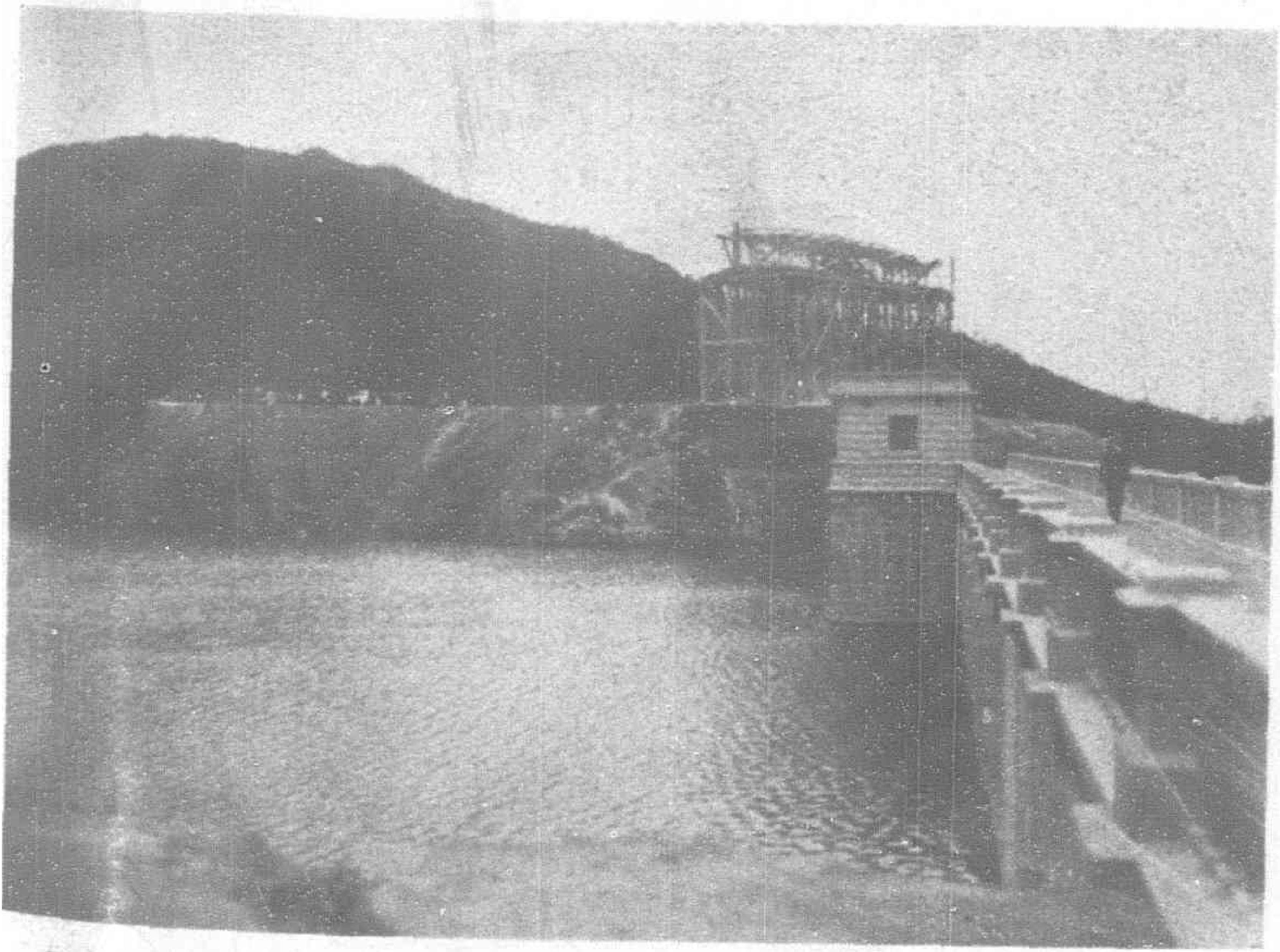


Fig. 24.—Cableway and Staging at Aberdeen Upper Reservoir

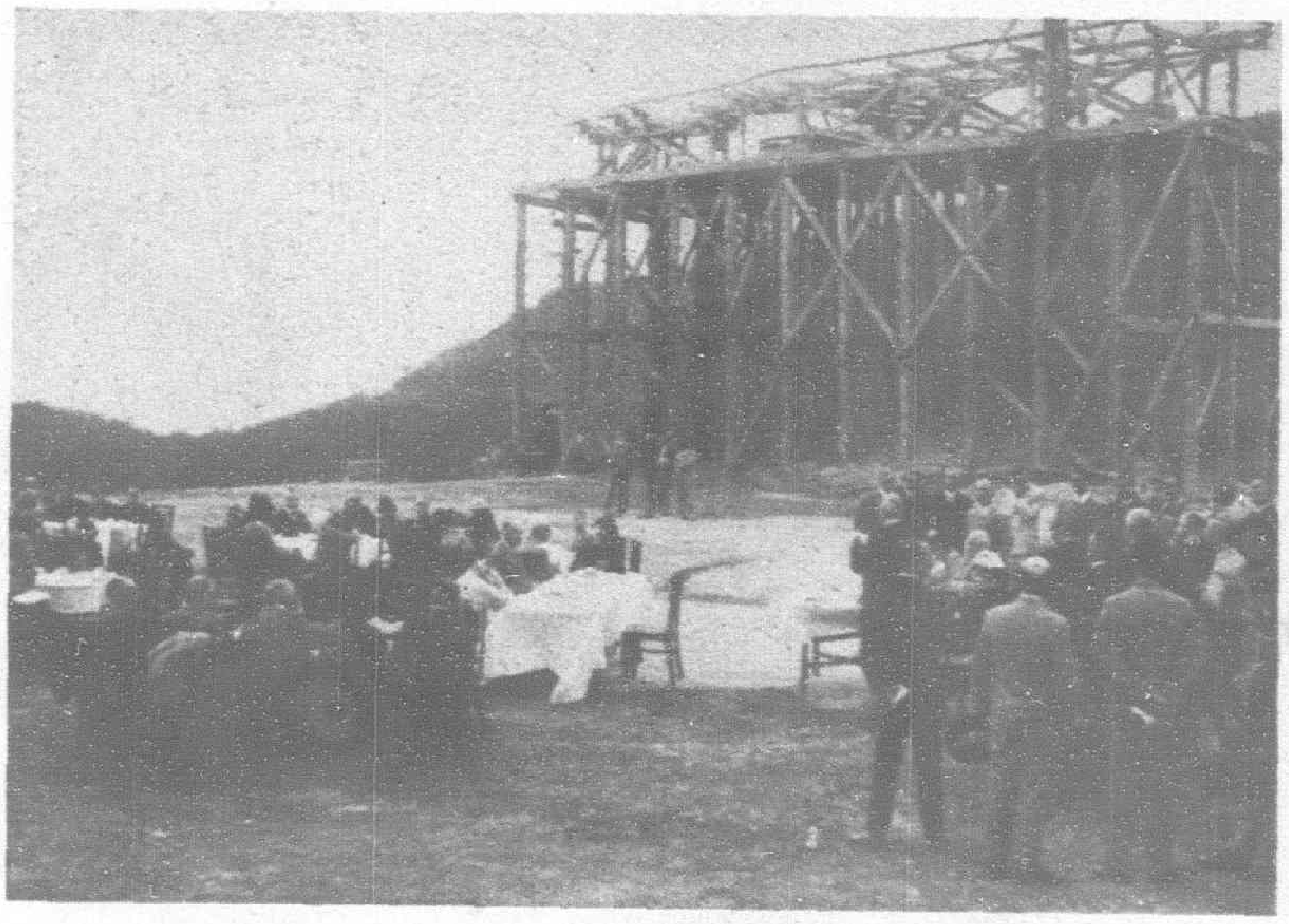


Fig. 25.—Opening of Aberdeen Upper Reservoir

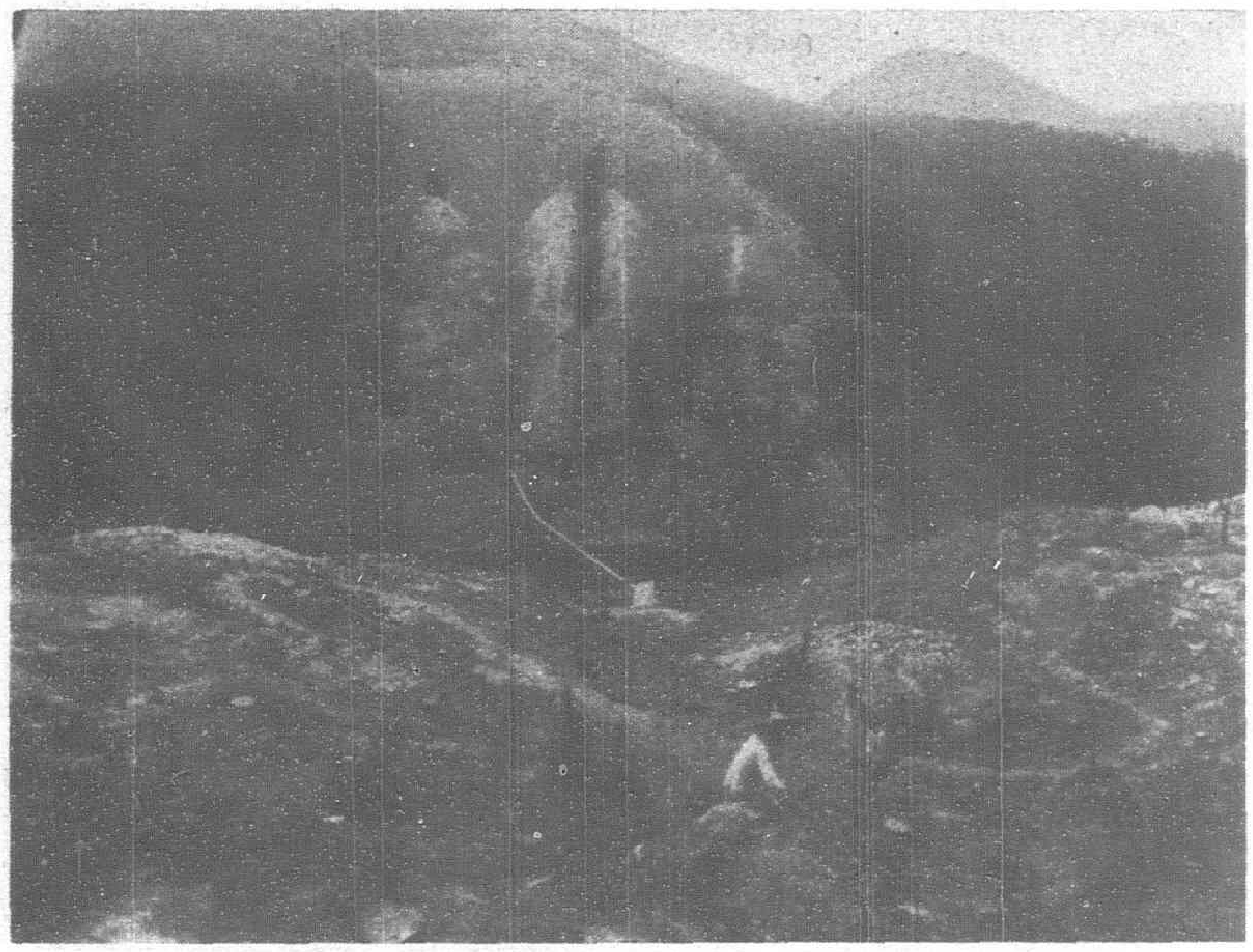


Fig. 26.—Aberdeen Upper Reservoir Preliminary Works

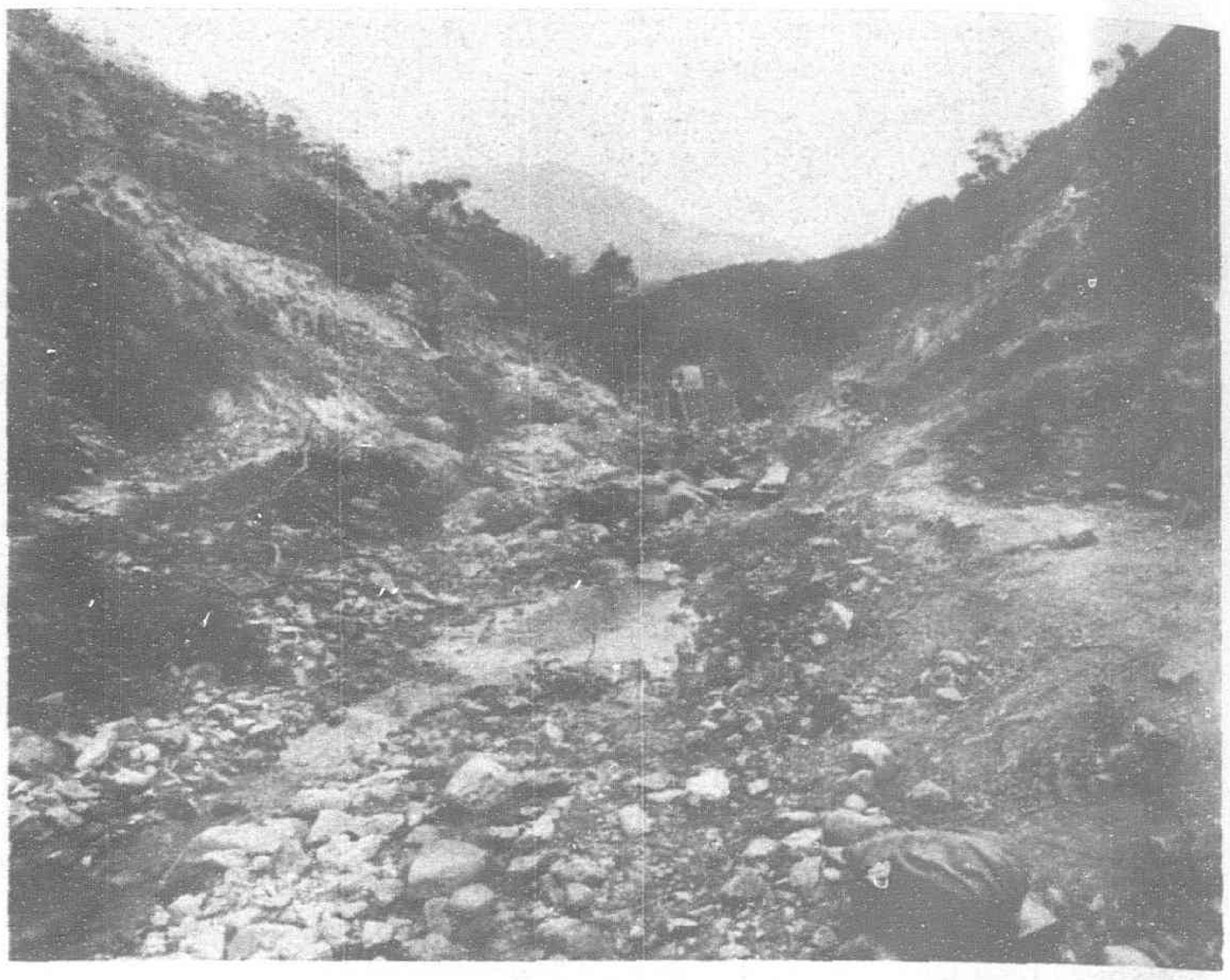


Fig. 27.—Gorge and Stream Bed before the Aberdeen Upper Dam was built

small concrete blocks three hundred feet apart with flexible wires stretched between them. Two portions of the line, over mud, were dredged and filled up with granite rubble to make a foundation for the pipe.

Anchor blocks, of concrete weighing about seventeen tons in air, were cast for placing over the pipe to prevent movement (Fig. 9). The diagram shows the details of these blocks.

Laying the Pipes in the Harbor

A barge, carrying a sixty ton capacity tubular steel sheer-legs, 70 feet high, with a horizontal travel of 40 feet and equipped with four steam winches and several auxiliary hand winches and capstans was used for laying the pipes and anchors.

The composite pipes were loaded on to a lighter and the lighter was towed out to where the laying barge was at anchor.

Laying was commenced in about sixty-five feet of water, the deepest part of the harbor, and was carried in each direction for a thousand feet. Then the Hongkong side was completed and afterwards the Kowloon side.

Divers went down to make the necessary joints, etc. It was possible for them to work only at certain periods between tides when the current was slack enough, although near the shore longer periods could be worked.

It took fifty-seven days to lay the pipe, the anchor blocks being put into position as soon as the pipe-laying was completed.

A diagramatic section of the bed of the harbor is shown. It will be noticed that the diagram is distorted as different scales had to be used for the distance across the harbor and the depth of the sea at different points. But the diagram gives a good idea of the shape of the ocean bed.

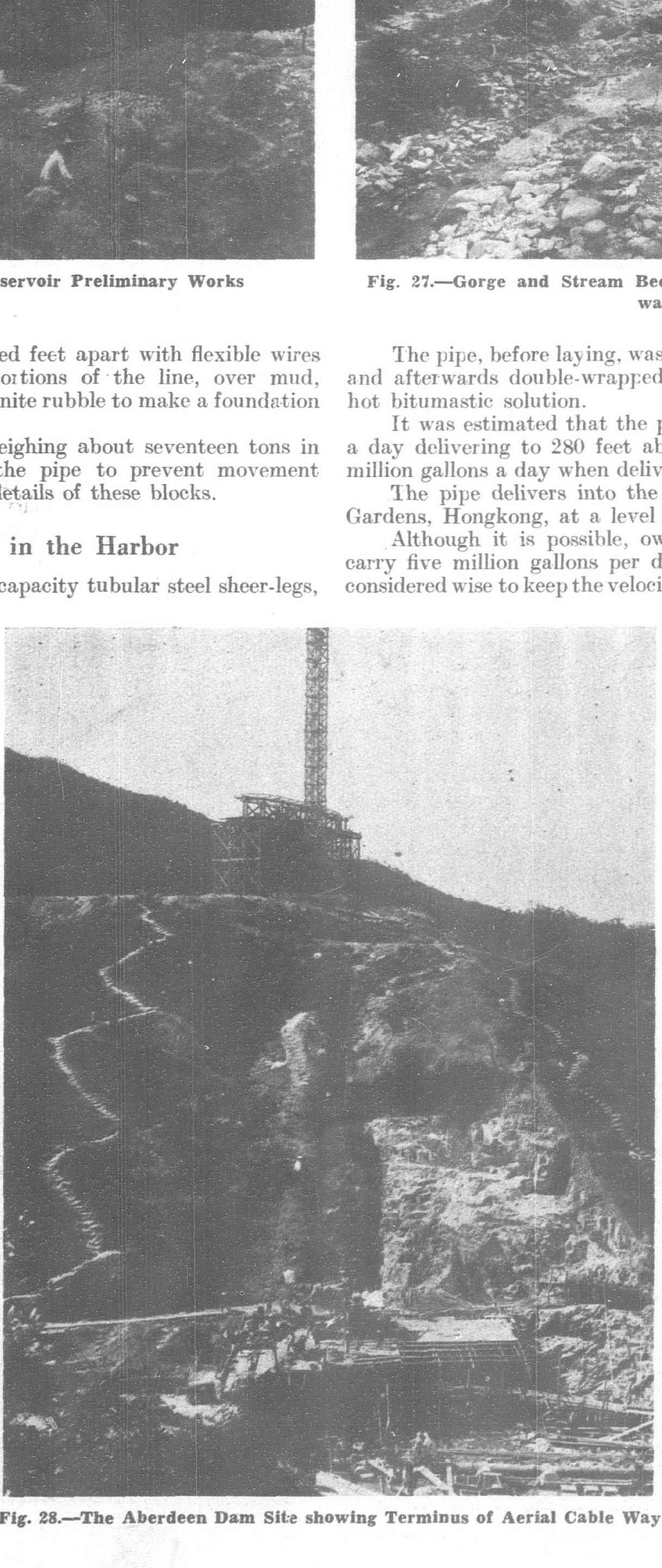


Fig. 28.—The Aberdeen Dam Site showing Terminus of Aerial Cable Way

The pipe, before laying, was dipped in a hot bitumastic solution and afterwards double-wrapped with bessian cloth drain through hot bitumastic solution.

It was estimated that the pipe would carry 3¼ million gallons a day delivering to 280 feet above sea level and four and a half million gallons a day when delivering to 180 feet above sea level.

The pipe delivers into the service reservoir in the Botanical Gardens, Hongkong, at a level of 240 A.O.D.

Although it is possible, owing to the big head of water, to carry five million gallons per day on the existing pipe line, it is considered wise to keep the velocity within six feet per second and the practical normal capacity of the pipe line is taken at 2½ million gallons per day. The higher velocity might create difficulties because the pipe is not anchored to the bed of the sea. A duplicate pipe parallel to the other will shortly be laid and it is considered safe to arrange for a flow of four million gallons per day.

The harbor pipe line delivers filtered water into a covered service reservoir situated in the Botanical Gardens in Hongkong. This is shown in Fig. 11 towards the left center of the picture. There is a circle in the center of the top of the reservoir and grass plots surrounded by concrete paths. Government House is shown just below this reservoir, in the center of that part of the picture showing the island.

A good view of the hillside and the congested dwellings on the island is shown in Fig. 12 where the covered service reservoir is shown clearly in the lower center of the picture.

This completes the story of the pipe line. The other details of the Shing Mun tunnels and supply will be given in the next contribution, which will deal with the mainland water storage and supply.

We will now return to the development of the other sources of supply and storage on the island, work carried out since 1920.

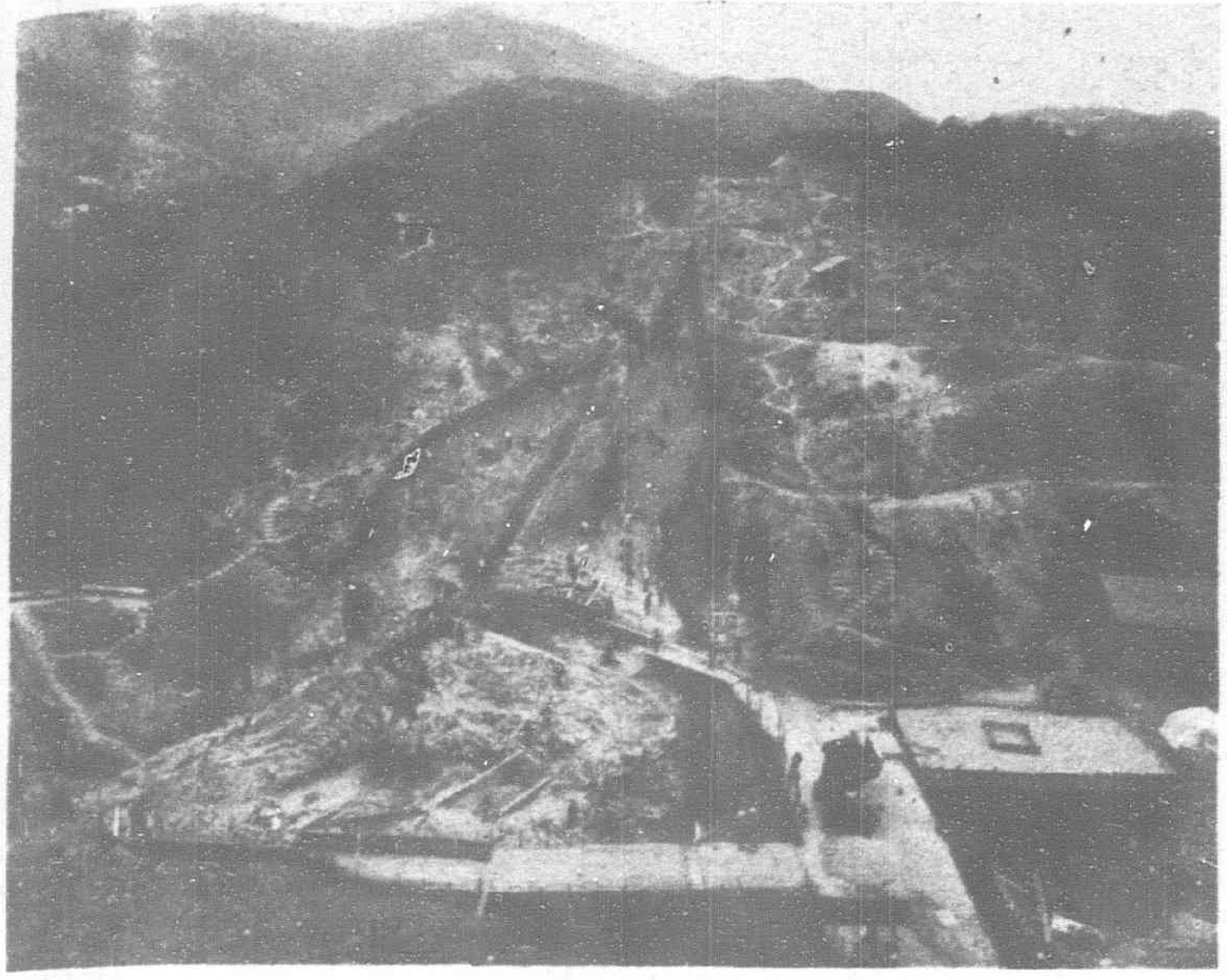


Fig. 29.—At Work on the Aberdeen Upper Dam

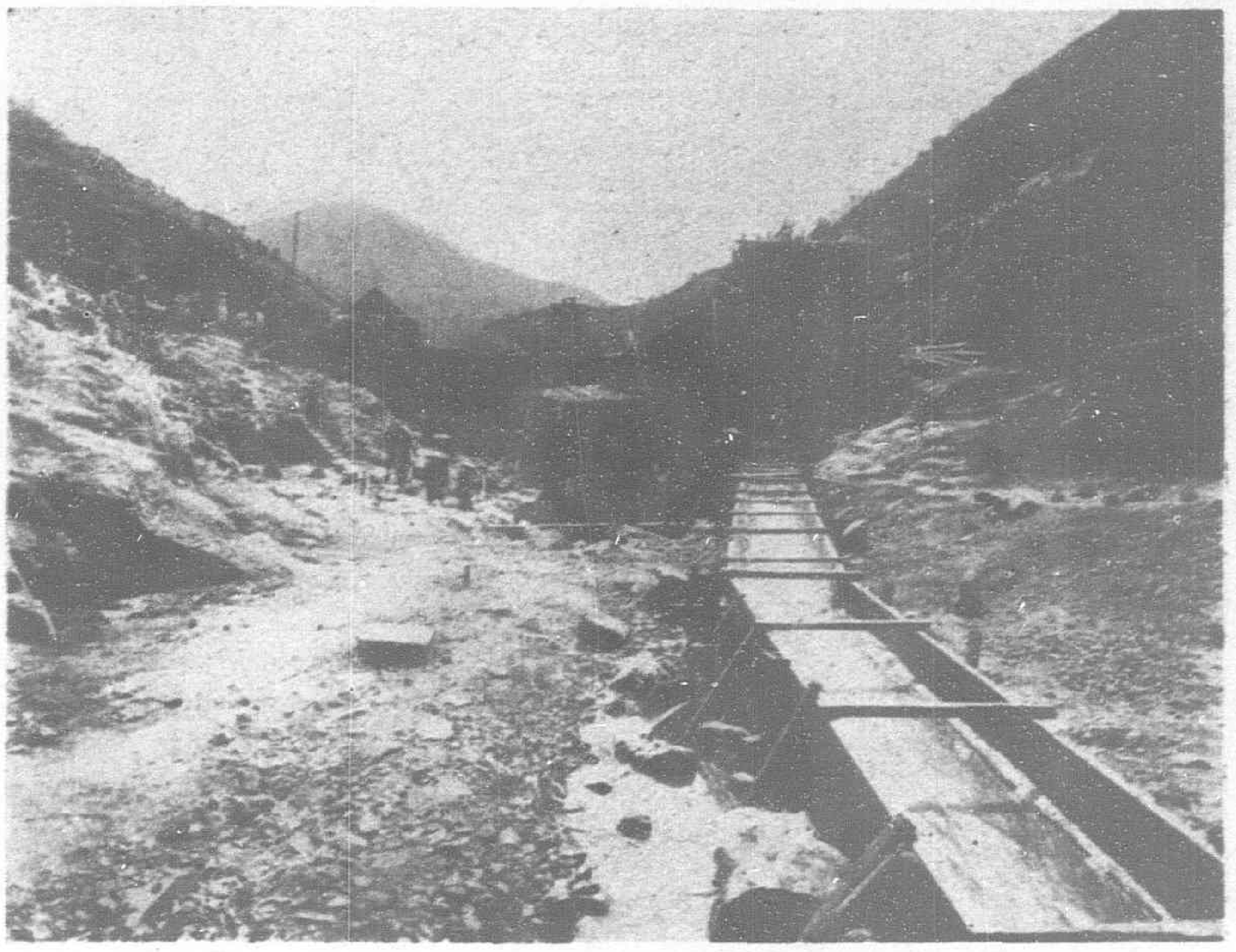


Fig. 30.—Flume for Stream Diversion during building of the Aberdeen Upper Dam

The Aberdeen Valley Scheme

It now remains only to consider the water supply obtained from the third catchment area on the island, viz. that known as the Aberdeen Valley scheme. That completes the story of the island supply.

This scheme was developed in recent years, chiefly because of the desire to obtain as much water storage, etc., on the island itself as was possible. It increased the catchment area by 1,390 acres (more than two square miles) and the storage by 272 million gallons (Fig. 13).

Many years ago a reservoir was built near the fishing village of Aberdeen, on the South side of the island, about three miles to the East or Pokfulum reservoir (1890). This was the enterprise of local Chinese who arranged for a supply of water essential for a paper manufacturing factory, built in the village of Aberdeen. It was quite a big mill and it was essential to have storage for a considerable volume of water.

The owners obtained sanction to build the reservoir ; for some years they owned this supply, but in the critical times of water shortage every possible method of storing rainfall was considered. Sir Cecil Clementi, when Governor of Hongkong was anxious to have as much water storage on the island as possible ; possibly he thought that the harbor pipe scheme might fail. The Government decided to take over this reservoir which is now known as the Aberdeen Lower Reservoir. It was also decided to build another reservoir near to, and above it. That is now called the Aberdeen Upper Reservoir. Fig. 12A shows, its position on the South side of the island.

Of course this scheme involved arranging new catchment areas and the extensive building of new catch waters on the south side of the island ; and also the laying of many miles of pipes for conveying the water from the reservoir to the new filter beds and the distribution center near the city of Victoria. It may be of interest to note that a total of about eight square miles of the island area is now reserved for catchment purposes.

The Aberdeen Valley scheme was commenced in 1929. The total cost was about two million dollars. But for the help of reservoirs connected with this scheme, which supplies some hundreds of millions of gallons to the city of Victoria in 1933, the water restrictions of that year must have been more intense.

This new scheme involved building an entirely new dam to create the Upper Reservoir and rebuilding the dam of the Lower Reservoir. The old dam is shown in Fig. 15. It was also essential to remove a great deal of silt which had accumulated in the reservoir used by the Paper Mill during past years. The position of the Aberdeen (Lower) Reservoir is shown in Fig. (16), the reservoir being empty.

It became necessary to build an access road to the two new reservoirs, and to considerably enlarge the catchment areas.

Water from this source of supply became available in August 1931. A steel pipe line, about five miles in length, delivers this water to the Eliot Filter Beds, situated above West Point. From that place it is distributed to consumers. The general scheme is

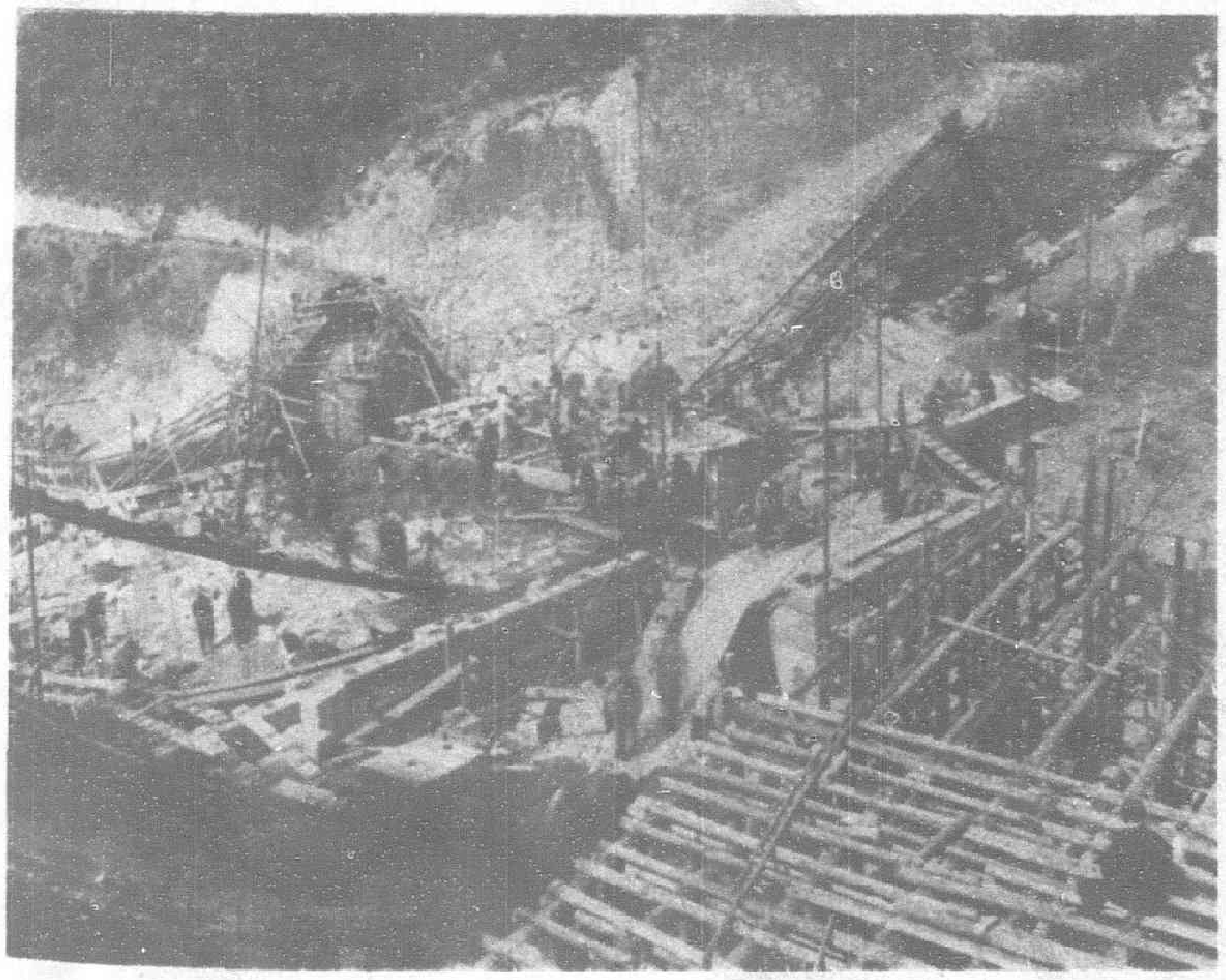


Fig. 31.—Girders and Scaffolding used during Building of the Dam

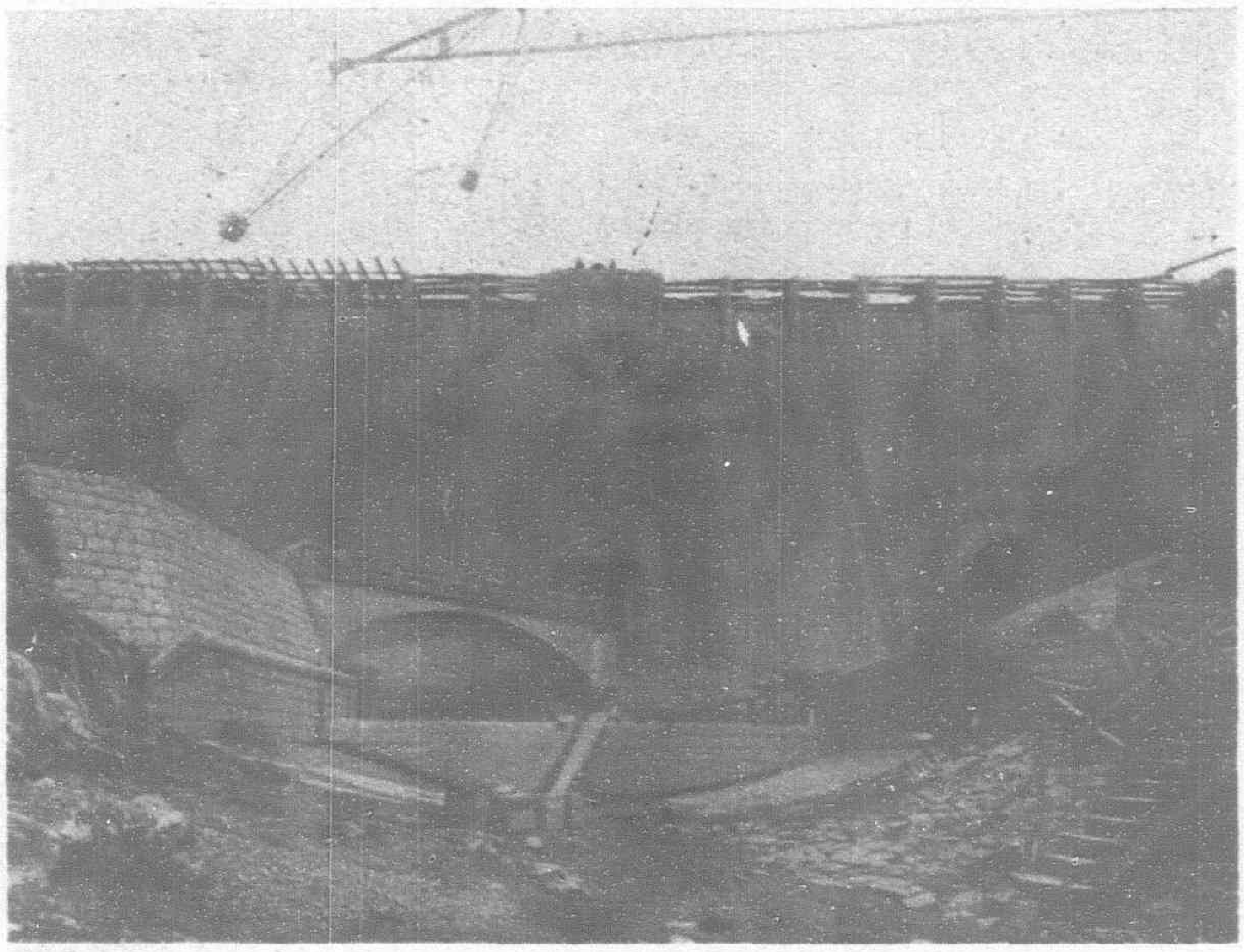


Fig. 35.—The Aberdeen Upper Dam nearing completion

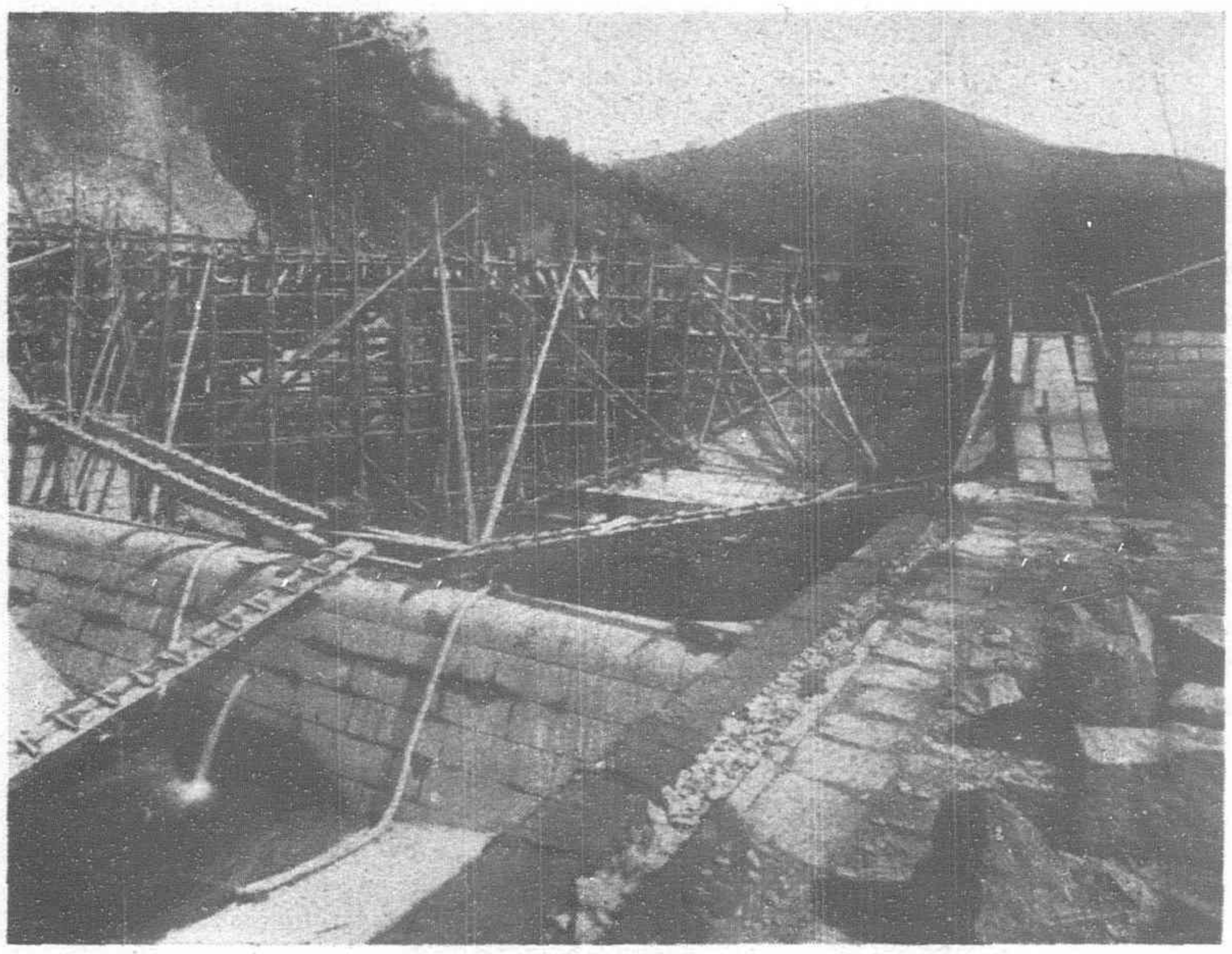


Fig. 33.—Last Stages of Construction of the Dam

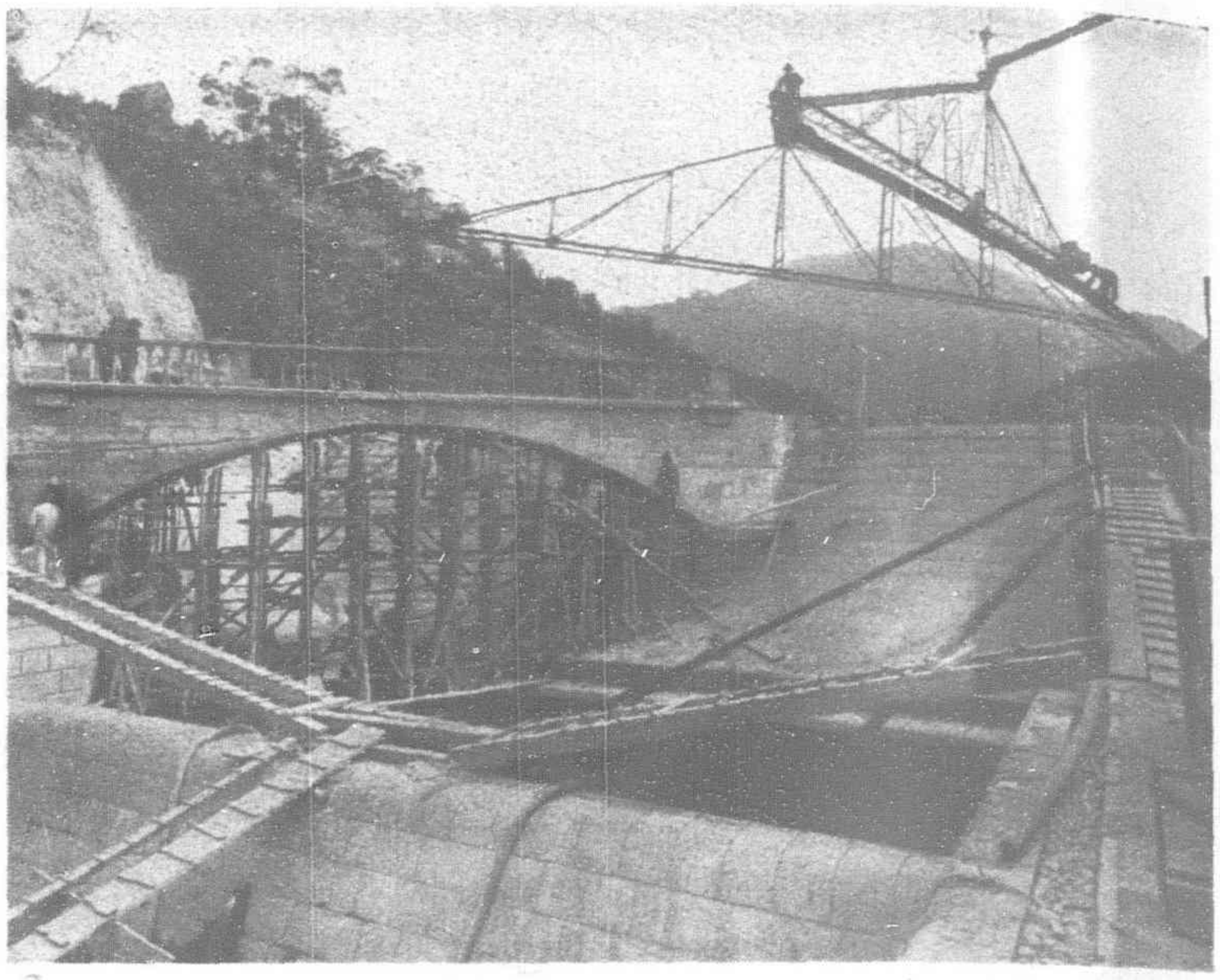


Fig. 34.—Building the Stone Arch for carrying Outlet Pipe

shown in Fig. 13, in which map the catchment areas in use and those that are considered possible for extensions and the reservoirs, etc., are shown.

Rebuilding the Dam

Owing to the great increase in the catchment area, and the fact that the existing dam of the old Paper Mill Reservoir was found to be in such a dilapidated condition, it was decided to carry out extensive alterations and modifications of the existing structure. The work was completed in September, 1933.

The old dam was of the buttress type. It had a length at road level of 440 feet. The maximum depth below overflow level to stream bed was sixty-three feet, and the length of the overflow was 110 feet at a level of 261.35 feet above sea level (A.O.D). The upstream face of the old dam and a portion of the reservoir is shown in Fig. 16.

It was decided to remodel the old dam. The upstream face was gone over in detail and made more watertight. The old downstream face during reconstruction is shown in Figs. 17 and 18. The dam was not destroyed but was strengthened; the downstream face was covered with concrete blocks (Fig. 19). These blocks were made on reclaimed land on the seashore at Aberdeen village, where granite, sand and cement were easily landed from junks. The blocks were transported by a cable way. The method of placing them in position with the help of scaffolding is shown in Figs. 20 and 21.

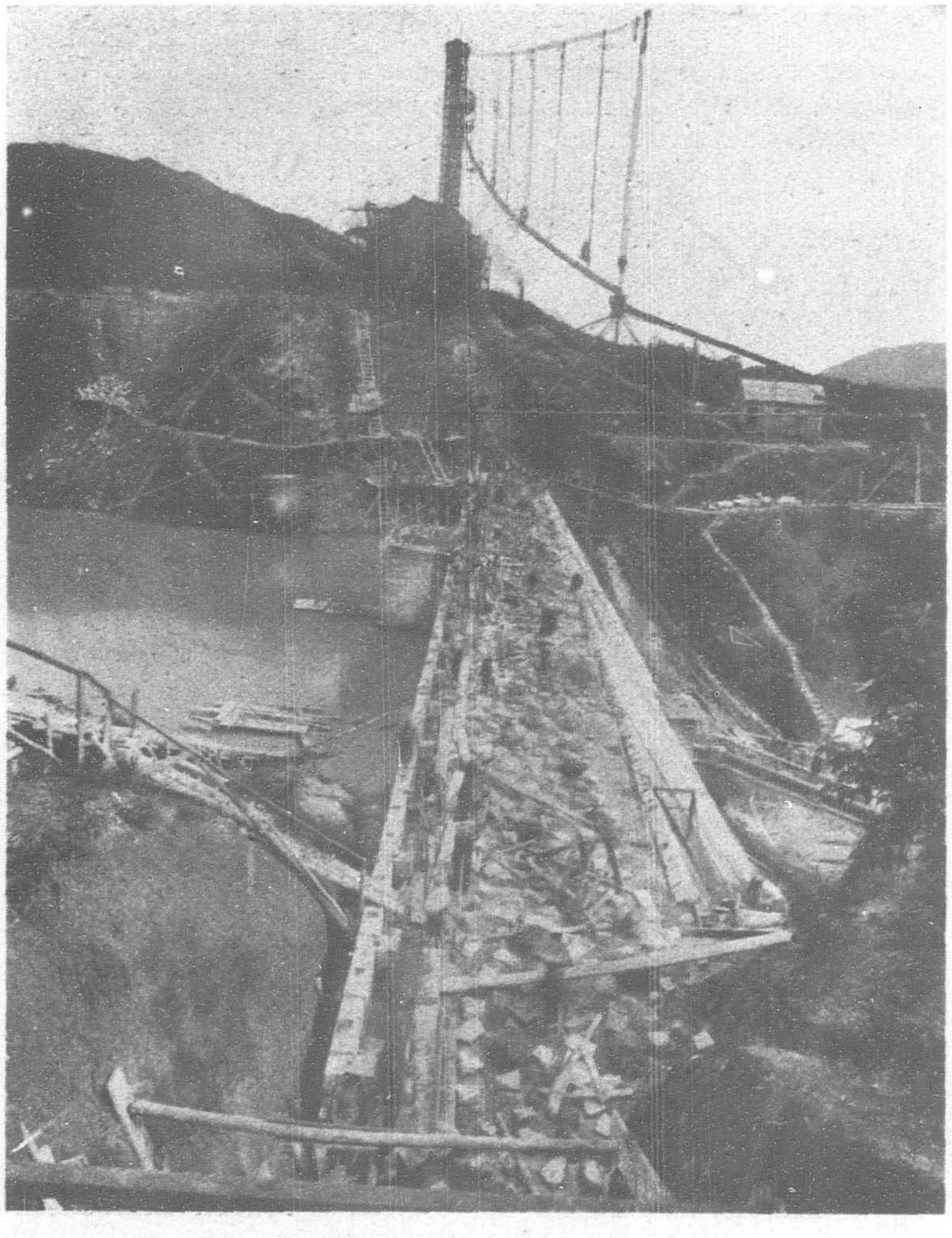


Fig. 32.—Pouring Concrete into the Dam

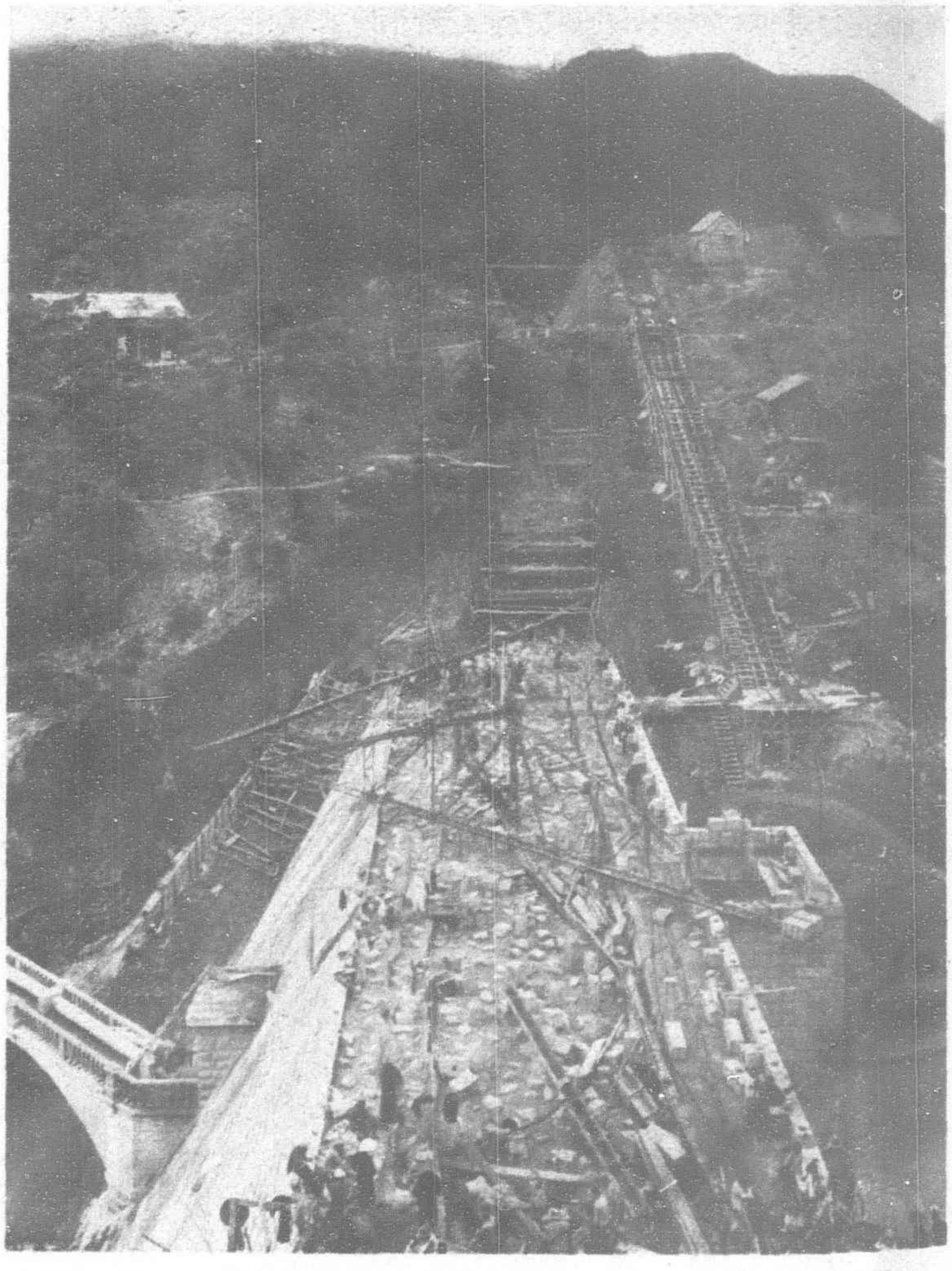


Fig. 36.—A View on Top of the Dam when nearing completion

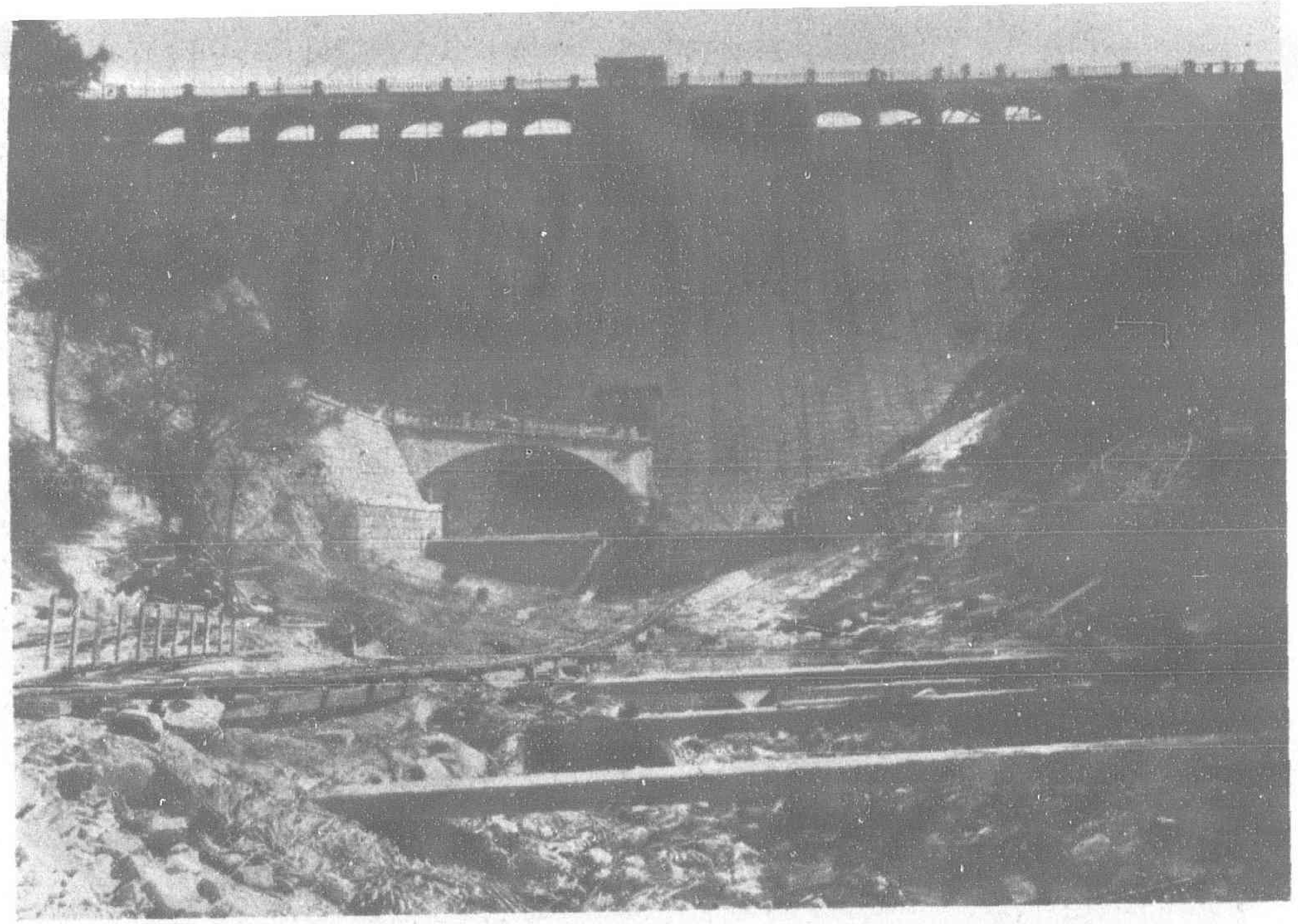


Fig. 37.—Finishing touches to the Downstream Face of the Aberdeen Upper Dam

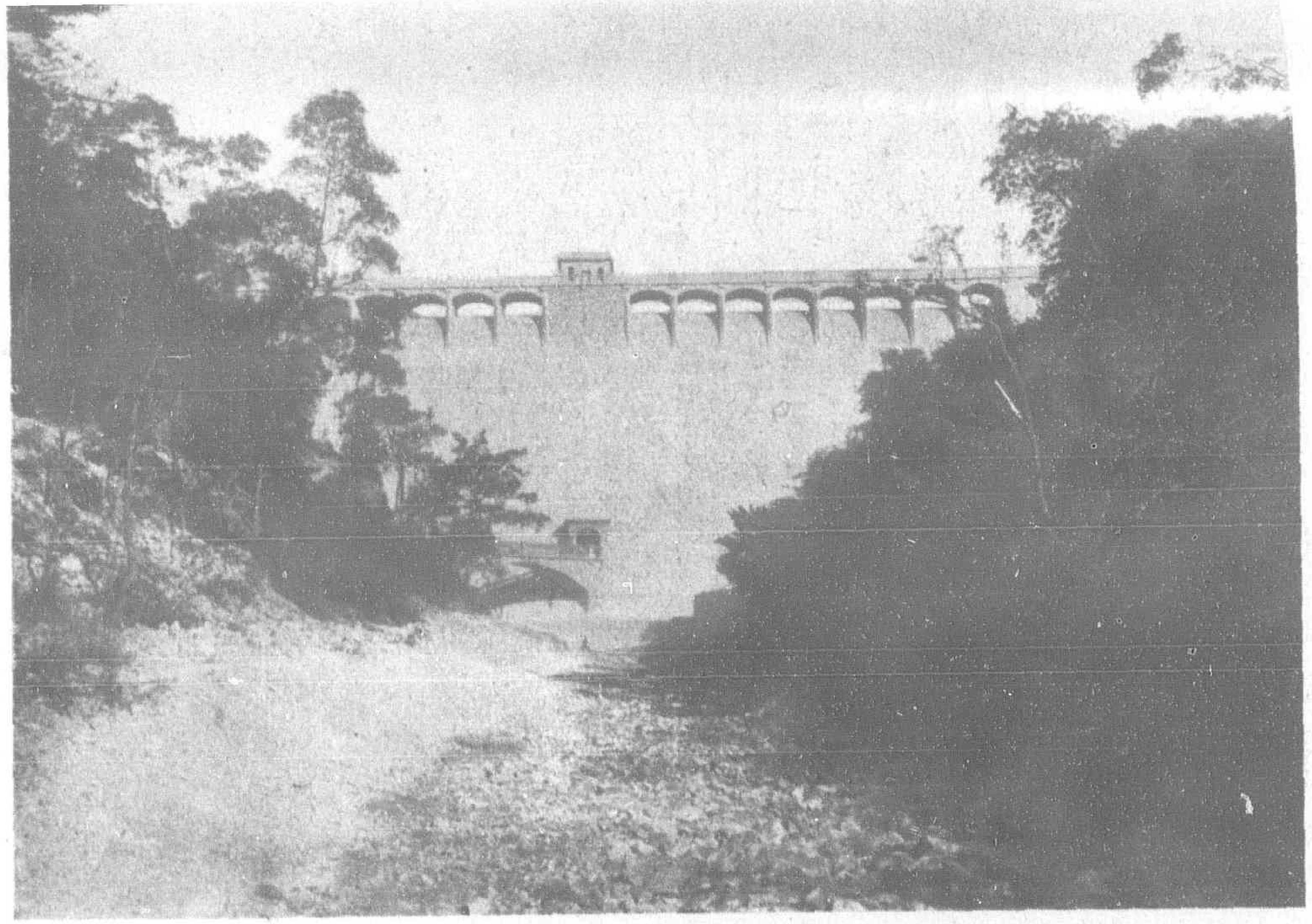


Fig. 38.—The Downstream Face of the Aberdeen Upper Dam

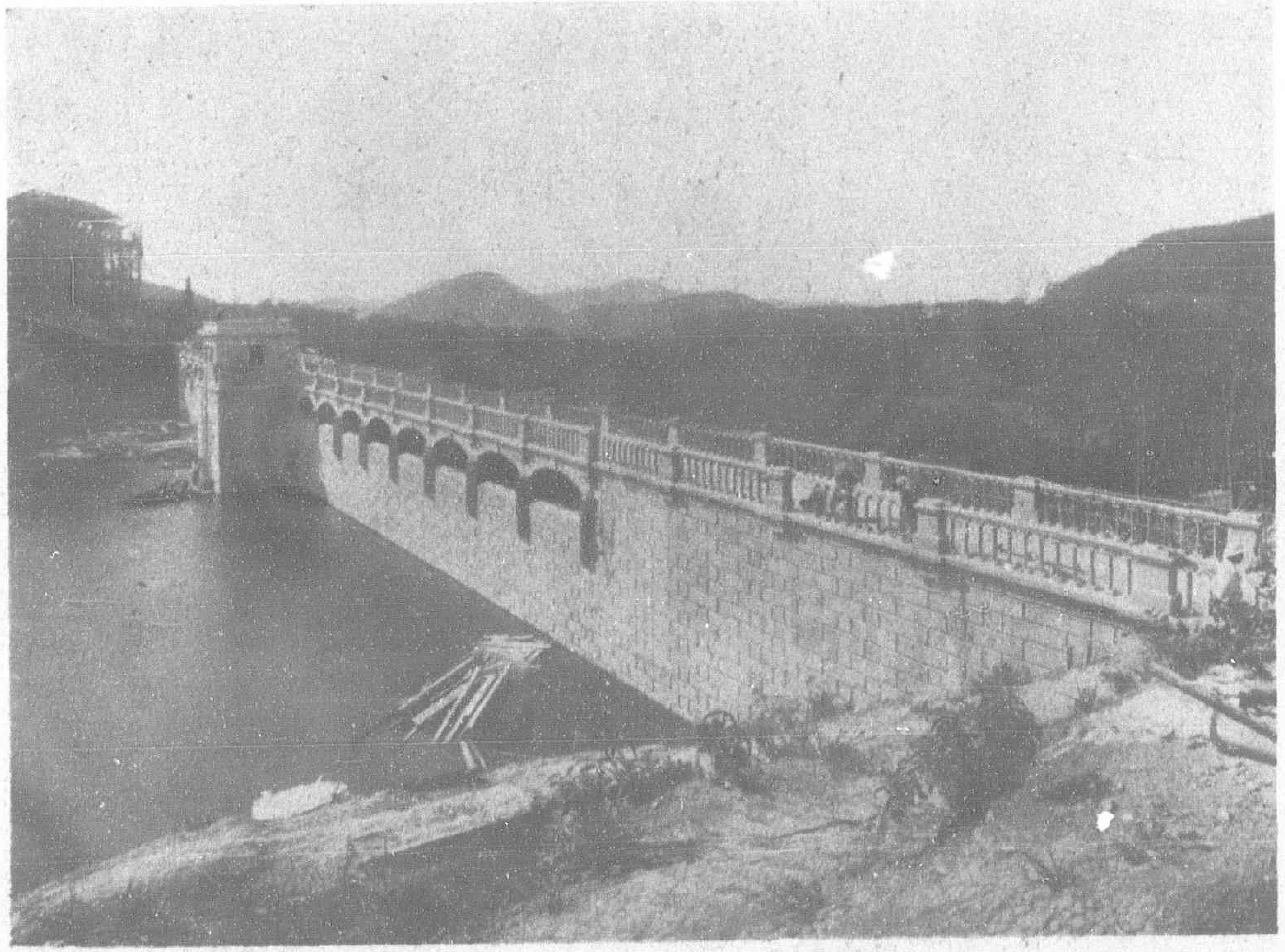


Fig. 39.—The Upstream Face nearing completion

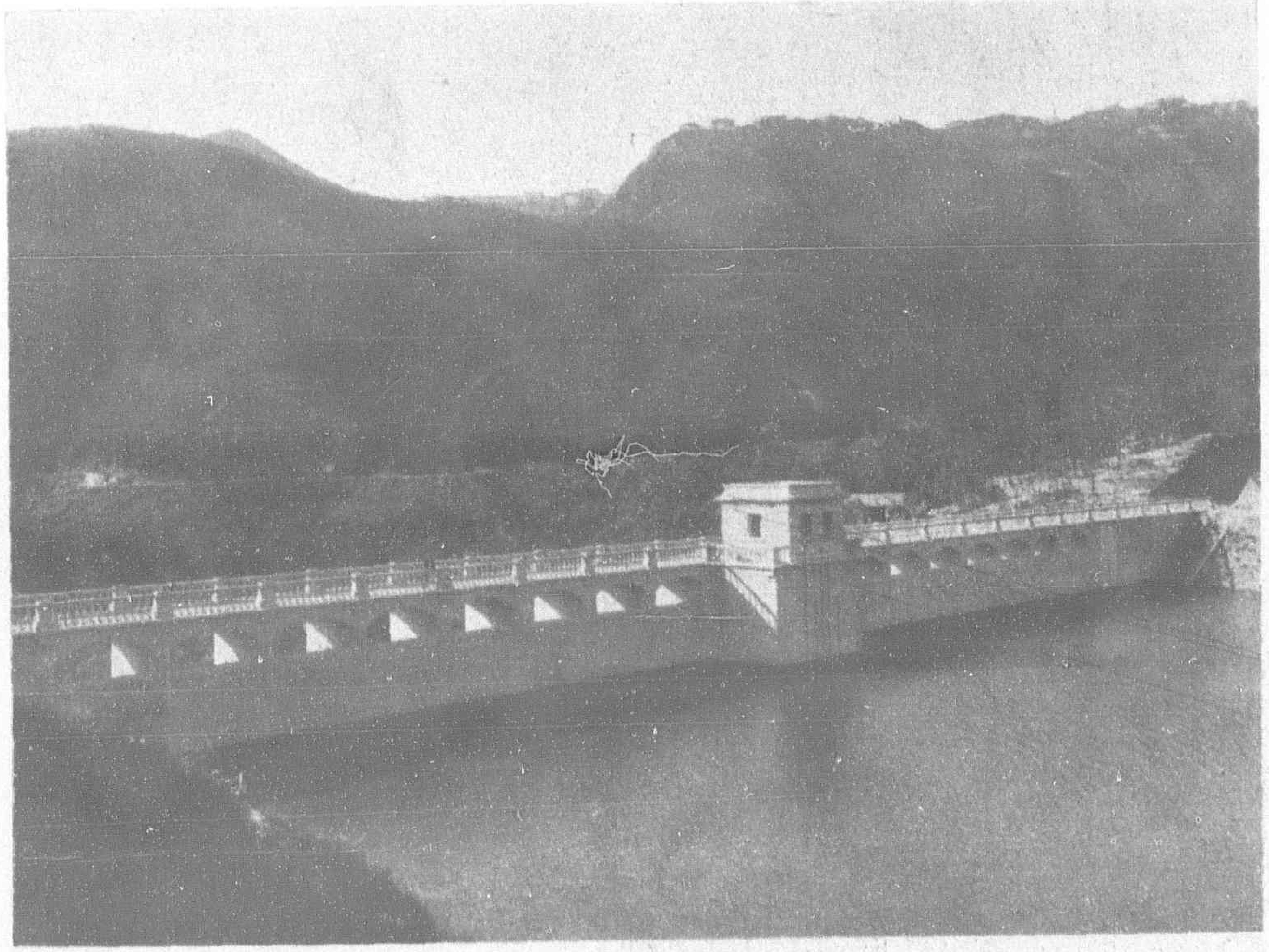


Fig. 40.—Aberdeen Upper Reservoir completed and Nearly Full

The China fir and bamboo scaffolding used during the repair of the downstream and upstream faces of the dam are shown in Figs. 21 and 22.

The reservoir has been enlarged by cleaning out the silt and removing other soil. In that connection it is of great interest to note that the experience with this reservoir goes to show that it is no more costly to enlarge it than to build a new reservoir. Thus, the cost of enlargement at Aberdeen works out at about 57 cents per cubic yard of water storage; and the cost of the new Shing Mun reservoir is calculated at 50 cents per cubic yard of water storage. But Shing Mun is on so much greater scale than the work at Aberdeen that it seems reasonable that, on works of equal magnitude, the cost would be about the same.

It must be explained that at Aberdeen the soil excavated was soft earth, and that a dump was handy. Indeed the dumped soil has made a sort of reclamation, or flat area (away from the reservoir), valuable to the Forestry Department; for the soil is aerated and productive.

It would be interesting to discover the possibilities of enlarging the planned reservoir at Shing Mun in this manner. It might be difficult to find ground suitable for dumping, for the quantities involved are numerous, as 6,000 cubic yards is only equivalent to one million gallons of water. But with all of the machinery now on the site the cost per cubic yard should be less than 57 cents, the figure at Aberdeen; although this method of obtaining water storage at Shing Mun is unlikely to be adopted.

This Aberdeen Lower Reservoir will be enlarged by silt and earth removal to hold an additional 10 million gallons. The total storage will be 110 millions when the work is finished.

Pumping Arrangements

The Aberdeen Lower Reservoir is not on a level sufficiently high for the water to run by gravity to the Eliot filter beds and adjoining service reservoir. A pumping station, fitted with electrically driven centrifugal pumps, was built near to the reservoir. The interior of this pumping station is shown in Fig. 23. The pipes are so arranged with valves that the pumps can deliver all (or part), of their output of water either to Eliot filter beds, or to the Aberdeen Upper Reservoir, whence the water can flow by gravity to the filter beds.

Not only were large new areas of land reserved for catchment for supplying water to these reservoirs, and many miles of catchment water channels constructed, but it was also necessary to build outfall nullahs to carry away to the sea the overflow from them.

The Mass Production Method

The dam for the Aberdeen Upper reservoir is built of concrete blocks, cemented together on the site. That method of mass production was found very economical. These blocks, also, were made at about sea level on the reclaimed ground at Aberdeen. They were then transported by the aerial cableway to the site of the dam, as were the other materials required for the work. The cableway can be seen plainly in Fig. 24, which also shows the staging for landing the blocks. This picture was taken during the day the reservoir was officially opened and visitors can be seen gathered together on the bank. The staging is also shown in Fig. 25 a picture taken at the opening ceremony.

This Aberdeen Upper Reservoir holds about 180 million gallons. It is 365 feet above sea level and is therefore able to feed by gravity.

The construction of this Aberdeen (Upper) Reservoir may be taken as typical of the sort of work that is needed for water supply. It is very much like that which has been carried out in connection with water supply for cities all over the world, but will be described in detail as it may be of value to engineers in China.

The outstanding feature of this class of work in Hongkong is its comparatively low cost. This reservoir was formed for about 400,000 Hongkong dollars. It would probably have cost ten times that amount to do the work in England. Local labor, and cement is cheap and the supply of granite and sand is easy, plentiful and economical.

The preliminary work of cutting out a sort of a socket to key one end of the dam on to one side of the gorge is shown in Fig. 26. Trial excavations are made on both hillsides and in the stream bed to determine the best site for the dam.

A view of the gorge and stream bed before the dam was commenced for the Aberdeen (Upper) Reservoir is shown in Fig. 27, which reveals clearly the type of site suitable for a new reservoir. Note the side of the Peak of Hongkong island in the background which forms part of the catchment area.

Stream Diversion

A good idea of the granite and disintegrated granite formation of the dam site, and the structure erected for the terminus of the cableway that carried the granite from the Aberdeen sea shore to the dam site, can be formed by a study of Fig. 28.

During the construction of any dam it is essential to make arrangements for the diversion of the stream. In Fig. 30 the wooden flume which carries this water away is shown together with workmen carrying granite boulders from the stream bed for breaking up into the aggregate needed to form concrete.

Although Fig. 31 looks as if there is some confusion, the picture gives some idea of the use of China fir poles and steel girders during the work on the dam.

The upstream face of the dam is holding water in the picture (Fig. 32) which also shows arrangements for filling up with concrete.

The downstream face of the dam is shown in Fig. 33, which shows the cushion for overflow. The stone arch for carrying the outlet pipe and downstream face is shown in Fig. 34. Two views of the dam nearing completion are shown in Figs. 35 and 36. The finishing touches to the downstream face of the dam are shown in Fig. 37, while Fig. 38 shows the downstream face of the dam as it is to-day. The upstream face of the dam nearing completion in Fig. 39 while Fig. 40 shows the upstream face of the dam when the reservoir is nearly full.

These two new Aberdeen reservoirs added a total of 283 million gallons to the storage capacity of Hongkong island and they have been invaluable for maintaining the supply for the past two years.

The Aberdeen Upper Dam was formally opened by H.E. the Governor Sir William Peel in December, 1931. The reconstruction of the Aberdeen Lower Dam was completed in September, 1932. Sites for additional reservoirs on the island have been selected but it is doubtful whether they will ever be built, as the land involved is so valuable. Thus a site not far to the east of Aberdeen, near to Deep Water Bay, is calculated to provide 2,500 million gallons, but it would upset many existing arrangements, including the island road and a village, if used. It seems that we have, for all practical purposes, reached the limit of storage on the island unless existing reservoirs are enlarged by excavations.

Island Service Reservoirs

It is, of course, impossible to give in detail all of the many miscellaneous works carried on the island from 1908 to date. But it is worth mentioning that there were extensions of filtering arrangements, and an increase in the capacity of service reservoirs. These latter now contain filtered water in storage which amounts to about 10 million gallons.

In 1913 contracts were let for a new pumping station, to the west of the University, for supplying filtered water to the Peak. The total estimates were $56,000. The old pumping station had proved a nuisance to the University, and was incapable of the extension required for new machinery to meet the increased demand on the Peak.

When the new station was completed a service reservoir of capacity 5.4 million gallons was built to the west of it and new filter beds installed. The estimate for these works was $200,000. The quantity of reinforced concrete work, including the roof of the reservoir was quite considerable. Few people who pass along the island road just beyond the West Point pumping station realize that the high retaining wall holds up millions of gallons of water stored behind it.

There are also extensive filter beds at Bowen Road where the Paterson system of mechanical filtration is employed. But as we shall deal more fully with this system later we will merely record that is being used in Hongkong and Kowloon.

In order to complete the story of the island supply a complete list of the reservoirs with their capacity is given later.

(Continued on page 422)

Kuala Lumpur Automatic Exchange Power Plant*

By *ANDREW A. STRACHAN, B.Sc., A.M.I.E.E.*

THIS paper deals with the power plant installed in the exchange for the supply of electrical energy thereto, but brief descriptions of the Dehydrating and Desiccating Plants are also included.

The paper would be incomplete without some reference concerning the development which has taken place throughout the years, due to the rapid advancement in telephony, both as regards growth and technique. A short resumé is therefore added on this subject.

In the early days of the telephone, electrical energy was required only for the operation of the transmitter whilst speech was in progress. The source of this energy consisted of primary cells located at the exchange and at each telephone station.

Signalling between exchange and subscriber's telephone, and *vice versa*, was done by means of hand-driven generators which developed an alternating current of about 17 cycles per second at a voltage of approximately 75-volts.

The calling and clearing device at the exchange took the form of an indicator composed of an iron-cored coil and hinged armature. When the associated generator was turned, the 17 cycle current passed through the coil winding, caused the armature to vibrate, which released a shutter and exposed the number of the calling subscriber.

An alternating current bell, which responded to 17 cycles, fitted to each subscriber's telephone, acted as the calling device when the exchange wanted a subscriber. Except for the replacement of the hand-driven generators in the exchange by one motor-driven generator, or ringing machine, this method of calling the subscriber is still in operation.

The above arrangement was known as the 'Magneto System'. As development took place and exchanges became larger, the exchange signalling arrangements underwent considerable alteration. This was necessary both from point of view of economy in space and ease of operation.

Automatic, or rather lamp clearing was first introduced. This was effected by inserting in the cord circuit, which is used to connect two subscribers through for speech, a combination of relays and a lamp. Later, the relay and lamp system was applied to the calling equipment in place of the indicator, thus the necessity of fitting hand-driven generators at each telephone was obviated.

A step further was made when the Central Battery system was introduced. This system was a decided improvement, in that it dispensed with all the local batteries at subscriber's premises, which not only reduced maintenance costs considerably, but made for better and more constant speech transmission.

From the foregoing, it will be noticed that the general trend was to centralize the electrical energy supply at the exchange, and, in doing so, this meant an increase in both voltage and capacity. The increase in voltage was essential because of the introduction of apparatus which would not work with precision if the original low voltages were retained. The increase in capacity was necessitated, of course, by the large increase in electrically operated apparatus.

The evolution and introduction of automatic working has thrown an additional lead on the power supply, which is now more than ever, the heart of the system, as without it, the whole exchange becomes inert. For this reason it has been, and still is the custom, to duplicate all batteries and charging machines.

Requirements of An Exchange Power Supply

The main points which must be considered in the provision of an exchange power supply are freedom from failure, constant voltage within fairly narrow limits, sufficient capacity to meet maximum daily demand, sufficient capacity to meet the ultimate

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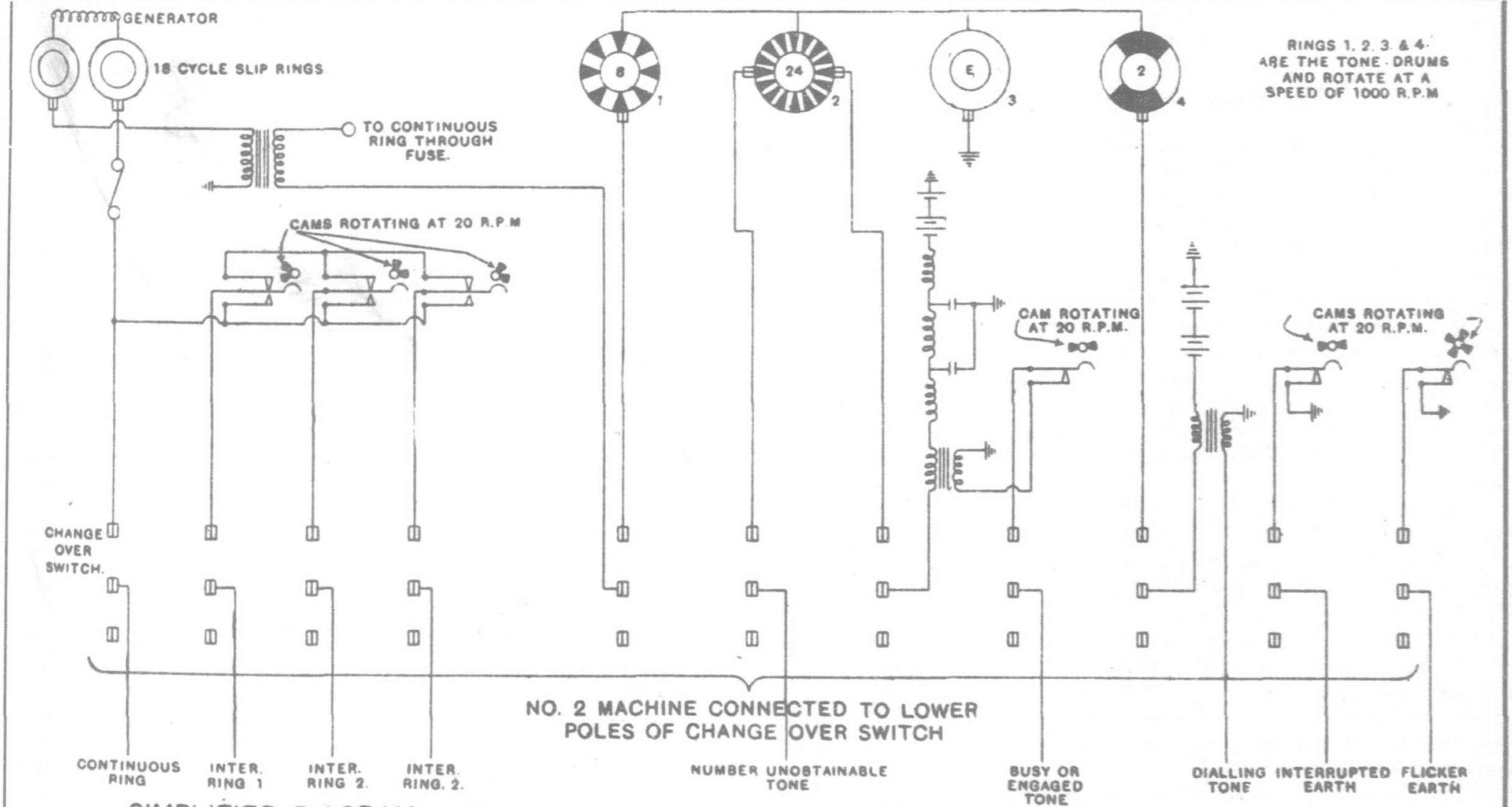
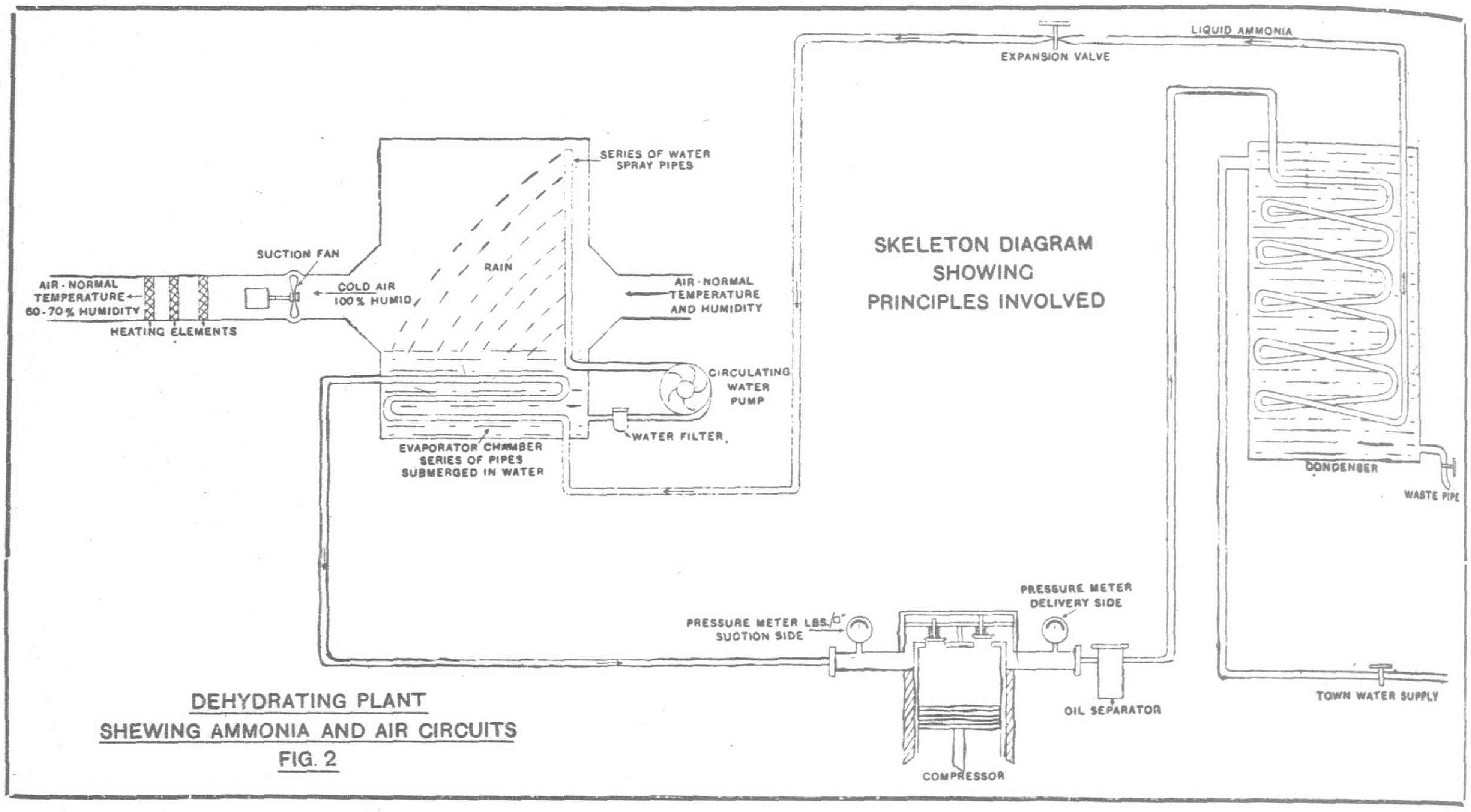
*Transaction of the Engineering Association of Malaya.


GENERATOR
18 CYCLE SLIP RINGS
TO CONTINUOUS RING THROUGH FUSE.
CAMS ROTATING AT 20 R.P.M
8
1
24
2
E
3
2
4
RINGS 1. 2. 3. & 4. ARE THE TONE-DRUMS AND ROTATE AT A SPEED OF 1000 R.P.M
CAM ROTATING AT 20 R.P.M.
CAMS ROTATING AT 20 R.P.M.
CHANGE OVER SWITCH.
NO. 2 MACHINE CONNECTED TO LOWER POLES OF CHANGE OVER SWITCH
CONTINUOUS RING
INTER. RING 1
INTER. RING 2.
INTER. RING. 2.
NUMBER UNOBTAINABLE TONE
BUSY OR ENGAGED TONE
DIALLING TONE
INTERRUPTED EARTH
FLICKER EARTH

SIMPLIFIED DIAGRAM RINGING AND TONE CIRCUIT. FIG. 1


LIQUID AMMONIA
EXPANSION VALVE
SERIES OF WATER SPRAY PIPES
SKELETON DIAGRAM SHOWING PRINCIPLES INVOLVED
SUCTION FAN
RAIN
AIR-NORMAL TEMPERATURE 60-70% HUMIDITY
COLD AIR 100% HUMID
AIR-NORMAL TEMPERATURE AND HUMIDITY
HEATING ELEMENTS
CIRCULATING WATER PUMP
WATER FILTER
EVAPORATOR CHAMBER SERIES OF PIPES SUBMERGED IN WATER
CONDENSER
WASTE PIPE
PRESSURE METER DELIVERY SIDE
PRESSURE METER LBS./□" SUCTION SIDE
OIL SEPARATOR
COMPRESSOR
TOWN WATER SUPPLY

DEHYDRATING PLANT
SHEWING AMMONIA AND AIR CIRCUITS
FIG. 2

demand, *i.e.* when the ultimate capacity of the existing exchange is reached—and freedom from hum or noise.

Secondary batteries are capable of meeting all these demands with very great success and these are employed in all exchanges of reasonable dimensions, and, where possible, in small exchanges.

In the case of large exchanges, which are invariably situated in large towns, an electric supply is always available and motor-generators are utilized to provide the suitable charging current for the batteries. The motors are either D.C. or A.C., depending on the type of supply.

In small towns and villages, where an external source of supply is not available, it is sometimes found more economical to install small petrol engines to which are coupled the charging generators. This has been obviated to a large extent, however, by the continued development of electric power supply, which in these days, reaches the most out-of-way villages, and batteries are charged direct from the mains by the use of rectifiers.

The voltages now generally used for exchanges are 24 and 50-volts. The former voltage is employed for exchanges up to about 100 lines and the latter for larger exchanges.

Kuala Lumpur Exchange Power Equipment

The power equipment necessary to operate the several types of apparatus in Kuala Lumpur is of a fairly extensive nature and may be divided into the following sections:—

(*a*) Power Plant for the supply of current to the automatic equipment and switchboards.
(*b*) Ringing equipment.
(*c*) Power plant for the supply of current to the carrier current apparatus.
(*d*) Power plant for the operation of the Dehydrating Plant.
(*e*) Power plant for the operation of the Desiccating Plant.

The main power supply is on the 3-wire system, 460-volts D.C. between the outer and 230-volts between the neutral wire and the outers. It is brought into the exchange by underground cable which serves the exchange alone. The cable is laid in through the exchange manhole, along the cable vaults and terminated on a power board supplied by the Electricity Department. On this board are accommodated the Department's meters and switchgear. Originally it was proposed to bring in an A.C. supply in addition, for the purpose of providing lighting for the building in case of breakdown of the D.C. supply. In view of the fact that an emergency petrol driven generator forms part of the power equipment, the A.C. supply was considered superfluous and was therefore abandoned.

All motors are served from the 460-volt supply whereas the 230-volt supply serves all lights, fans, also power ringing dynamotor and the direct charging current for the 132-volt carrier batteries.

Power Room

In this room are located the main exchange powerboard, motor generators for charging the main battery, the emergency generating plant, the carrier powerboard and motor-generators, and the ringing machines.

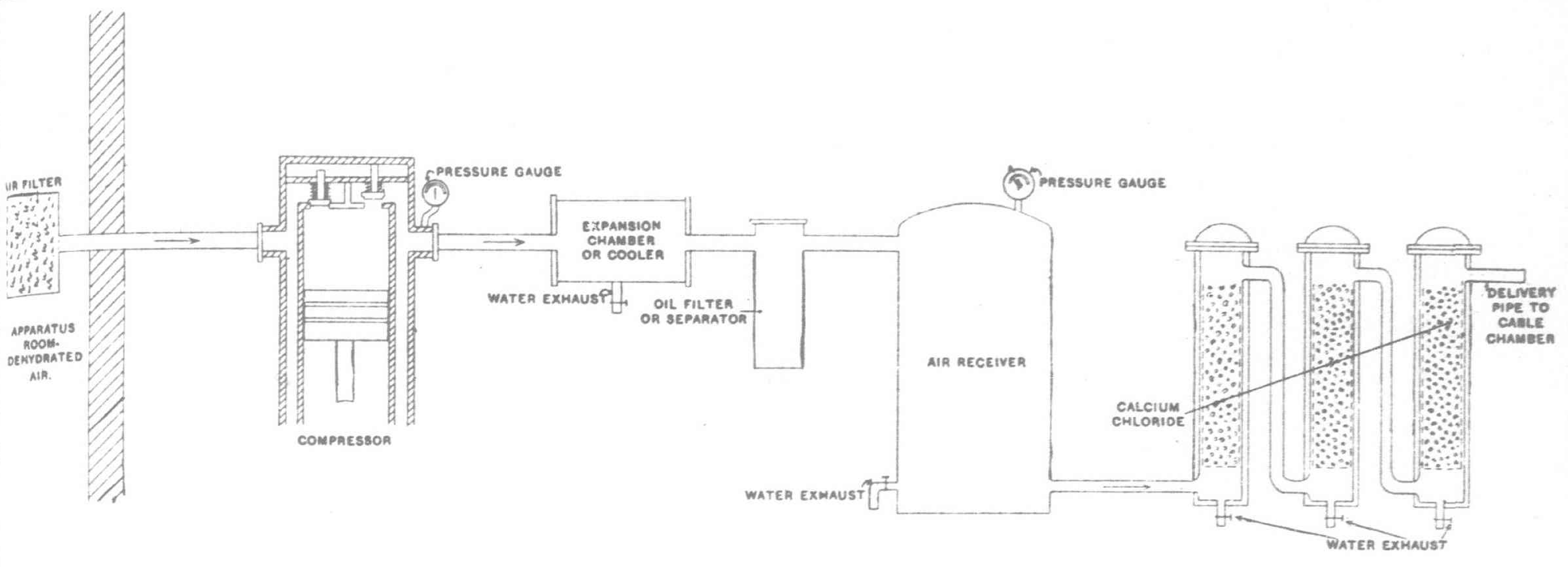
Lead covered cable is used throughout and all cables are carried in overhead cable runs. The walls for part-way-up and the machine beds are finished with white tiles, and the machines, cables and ironwork are painted battleship grey. The room is slightly overcrowded because of the fact that it was designed originally, to house the exchange power plant only, but, as a whole, it has a very fine appearance. The finish of all apparatus, machines, and especially the main powerboard, is of a very high standard.

Two motor-generator sets by Messrs Crompton Parkinson Ltd. are used for charging the main batteries. The motor is of the enclosed ventilated type, shunt wound, is rated at 23 b.h.p. at 950 r.p.m. and takes a current of 46 amps.

To each motor is direct coupled, by flexible coupling, an enclosed ventilated, shunt wound generator which gives a rated output of 280 amperes at 57-volts with a voltage regulation of 50 to 67-volts.

Emergency Generating Plant

Due to flooding in previous years, the main supply was liable to be cut off for protracted periods and the installation of an alternative supply was considered to be advisable. This is provided by a Crompton-Parkinson 3-wire D.C. generator, designed to give an output of 30 k.w. at 950 r.p.m. The bearings are of the ball and roller type and a static balancer is provided which deals with an out-of-balance current of 25 per cent on the neutral wire. The generator is direct coupled, by flexible coupling, to an Aster, vertical, 4-cylinder, water-cooled petrol engine. The petrol engine develops 48 b.h.p. at 950 r.p.m. and is fitted with a governor which controls the throttle. A large flywheel is equipped in order that the fluctuation of speed may be reduced to a minimum.



SKELETON DIAGRAM SHOWING PRINCIPLES INVOLVED.

DESICCATING PLANT
SHOWING AIR DRYING PROCESS
FIGURE 3.

The petrol feed is by gravity, the tank being fixed on brackets to the verandah wall outside. The exhaust pipe is run overhead and down to a point below the verandah floor where two silence boxes are fitted. The water cooling system is gravity and water pump combined. Three large capacity tanks for tropical work are located on a reinforced concrete platform in the yard at the back of the exchange. These tanks are connected in series and to the engine by 2½ inch piping cleated to the walls.

Ringing Machines

These machines generate an A.C. of approximately 17 cycles per second and their main function is to provide the ringing current for operating the bell on the subscribers' telephones. In addition to the ringing current they also supply the several tones which are used in automatic working.

The machines are duplicated and are of the dynamotor type, —*i.e.*—a dynamo and motor combined in one, using the same field magnets but with separate commutators. One machine is driven from the main 230-volt D.C. supply and the other from the exchange 50-volt battery. Normally the power driven machine is in use and equipment is provided on the power board whereby, in the event of failure of the main supply, a change over switch operates automatically and cuts in the battery driven machine. Visible and audible alarms are operated when this occurs which brings the fact to the notice of the attendant and enables him to investigate the cause.

The commutator shaft is extended to accommodate slip rings and an interrupter drum. A further extension is supported on two bearings, between which is a reduction gear running in oil. This gear rotates a spindle at right angles to the commutator shaft, and on each end of this spindle are cams, which operate sets of interrupter springs.

The slip-rings provide the ringing current. One lead is taken direct to the fuse distribution board and supplies the uninterrupted or continuous ringing current used for the carrier apparatus and for testing purposes. Three other leads serve the exchange through three sets of interrupter springs operated by cams in turn, so distributing the load on the machine. This is the interrupted ringing which is heard when a subscriber is called.

The tone-drum, which rotates with the commutator shaft at a speed of 1000 r.p.m., about 17 cycles per second—is divided into four rings, *viz*:—

(1) The earth-ring, which is a complete ring and feeds earth to the other tone-rings.

(2) The 'number unobtainable' and 'busy' or 'engaged' tone-ring. This ring is divided into 24 equal segments, thus producing a tone of, approximately, 400 cycles per second. Two leads are taken from carbon brushes, one direct, which supplies the 'number unobtainable' tone, and the other through a cam operated interrupter spring and supplies the interrupted 'busy' tone which is heard when an engaged subscriber is called.

(3) The 'dial' tone-ring. This ring is divided into two equal segments, and supplies a tone of about 33 cycles per second. This tone is heard on lifting the telephone receiver so indicating that dialling may commence.

(4) The 'ringing' tone-ring. This ring is divided into eight equal segments and superposes a tone of about 130 cycles per second on the 17 cycle ringing leads. This tone is sent out to the calling subscriber when a call has been made, so informing that the wanted subscriber's bell is operated.

The interrupter springs, operated by cams rotating at a speed of 1 rev. in three seconds are six in number. Three are used for interrupting the ringing, and a fourth for interrupting the 'busy' tone, as previously mentioned. Two others supply interrupted and flicker earths, respectively. These are used for testing purposes. Figure 1 shows the several circuits in a simplified form.

Exchange Power Board

The powerboard is made up of three marble panels. At the back of the left-hand panel a 3-pole change-over switch is fitted, the shaft of which projects through to the front of the panel and is equipped with a hand-wheel. On one side of the switch the three main supply cables are terminated and the three wires from the emergency generator are terminated on the other. From the centre points, cables are taken to the distribution fuse box on the wall at the side of the powerboard. All the motors, including those dehydrating, desiccating and carrier plant, are fed through separate fuses, one leg of each lead being taken through a separate meter which enables the cost of running each machine to be read direct.

By means of the 3-pole change over switch, the emergency generator can be brought into service in the event of failure of the main supply. It should be noted that this generator is not capable of taking the whole lead at one time, but by continuous running in the case of a protracted breakdown, it would be possible to run the exchange and its auxiliary equipment in a reasonably efficient manner. The exchange lighting may also be taken from the emergency plant but the main leads are not fed through the fuse distribution box.

The switches and starting gear for the exchange motors are located on this panel, also a regulator and circuit breaker for the emergency generator. Main supply meters are provided, the ammeter having two ranges, -0-100 amps. and 0-10 amps. for the 460 and 230-volts supply, respectively. At the bottom of the panel two 500 ampere, roll chart, recording ammeters are accommodated. These are connected, one in the supply side and the other in the discharge side. The efficiency of the charging plant and batteries may be determined from the two graphs over the 24 hours. The discharge curve is proportional to the number of calls made throughout the day and is therefore a check on the number of calls metered.

The center panel contains the generator, battery charging, and discharge switches, generator regulators, overload and reverse-load cut-out and meters. The generator and battery charge switches are of the single-pole, double-throw type which close the circuits for Generator No. 1 and Battery No. 1, respectively, in the top positions, and Generator No. 2 and Battery No. 2 in the other position. The switches, of course, operate independently. The battery-discharge switch is a single-pole, rocker, knife switch, one arm making before the other breaks. This enables the batteries to be changed over without interrupting the supply to the exchange. These switches are capable of carrying a current of 500 amperes.

A 300 ampere over-load and reverse-load circuit breaker is provided and is adjusted to operate on a load of 280 amperes.

The voltmeter has a range of 0-80-volts and a multiple voltmeter switch enables it to read the two generator voltages, the two battery voltages and the voltage of the supply to private branch exchanges.

The ammeter has two ranges, 0-500 amperes and 0-15 amperes. A multiple switch is provided which enables it to read on the higher scale, the battery charging current and the discharge to the exchange, and the current taken by the ringing machine and private branch exchange on the lower scale.

On the right-hand panel is accommodated the supervisory alarm and ringing switching gear. Two voltmeters, one connected across the battery on discharge and the other across the automatic feeder fuse board, are located at the top of this panel. These voltmeters are fitted with two contact pointers which are adjustable. The range of the voltmeters is 30-60-volts full scale. Normally the contact pointers are set to read about 48-volts minimum and 53-volts maximum. If the exchange voltage falls or rises to reach these voltages, an alarm is given. The difference in the reading indicated on the two meters shows the potential drop between the battery and fuse board.

The fuses for the several alarms are located on this panel. These alarms include the High and Low Voltage alarm referred to in the previous paragraph, the meter battery alarm, the ring fail alarm, the ring tone fail, dial tone fail, number unobtainable tone fail alarms and the hygrometer alarm. Should one of these fuses blow, a lamp is lit, and at the same time an alarm bell is sounded.

At the bottom of the panel, two 8-pole change-over switches are fitted. These switches are equipped with a trip coil which is connected in the power ringing machine circuit. If the power fails the trip coil becomes de-energized, releases the switches, which drop under gravity, and cut in the battery driven ringing machine, When this takes place the ring fail alarm operates. In the case of the battery driven ringing machine a circuit breaker is included in the circuit, whereby the battery is disconnected from the machine if a fault occurs. Normally the power driven ringer is in service.

Battery Room and Battery Installation

The battery room adjoins the power room. It is tiled part way up with white tiles, is provided with a large sink with water tap and equipped with two exhaust fans. A lead lined box, on a stand and fitted with a small tap, is used to contain distilled water.

The batteries were supplied and installed by the Chloride Electrical Storage Co., Ltd. and the installation consists of two sets of identical batteries of 25 cells each. The cells are arranged in four rows, the negative and positive poles terminating at the same end. The stands are of teak and are formed of two long runners supported on cross pieces. Under each cross piece are placed two large, porcelain, mushroom type insulators and four similar insulators, but much smaller in size, are used to support each cell.

The containers are wood boxes lined with lead. Each cell has 13 plates—6 positive and 7 negative—and increase in the capacity has been allowed for by utilizing displacement tanks which consist of wood boxes completely covered with lead. These tanks fill up the space unoccupied with plates and are removed when it is found necessary to provide extra plates. The tanks are fitted with lids and are weighted down with bricks placed inside.

The plates are of the Planté type and are lead burned to channel bars. The present capacity of each battery is 1016 ampere-hours at the 10 hour rate of discharge and the ultimate capacity is 2,451 ampere-hours at the same rate. The weight of one battery is about 10½ tons.

At the negative end of each battery a fuse box is placed which accommodates a fuse of 600 amperes fusing current and to which the negative pole is connected by a copper bar. From these fuses and from the positive pole of each battery lead covered cables are taken to the powerboard where the positive leads are connected to the main earth bar.

A set of seven counter e.m.f. cells is located in one corner of the battery room. These are connected across a subsidiary circuit of the main battery and in opposition thereto, so providing a voltage of 32-volts which is used as a power supply for the private branch exchanges.

The reason for utilizing a battery for this purpose is to enable the main voltages to be reduced without the necessity of inserting a resistance in the circuit.

Carrier Current Apparatus Power Plant

General.—Two types of supply are necessary for the carrier current apparatus, *viz*:—a 24-volt supply for the valve filaments and a 132-volt supply to provide the positive potential for the valve plates.

The charging machines for the 24-volt batteries and the power boards for both batteries, as previously mentioned, are accommodated in the same room as the automatic exchange power plant. The batteries are accommodated in a separate room which is fitted with one exhaust fan. The cables between powerboards, machines and batteries are all lead covered and are carried in over-head cable runs.

Motor-Generators.—The motor-generators are for charging the 24-volt batteries, the 132-volt batteries being charged direct from the 230-volt D.C. main supply through a resistance. As usual two machines are installed in case of break down.

The machines are by the Electrical Construction Co., Ltd. and consist of a D.C. motor direct coupled by flexible coupling to a generator. The motor is rated at 11.2 b.h.p. at 1,000 r.p.m. and takes a current of 21.6 amperes. The generator is rated at 6.7 k.w. and supplies 240 amperes at 28-volts. Both motor and generator are of the enclosed ventilated type and are shunt wound.

The motor starting gear is separate from the powerboard and is located beside the individual motors.

Carrier Power Boards.—These consist of two marble panels placed side-by-side, the left-hand panel accommodating the equipment for charging the 132-volt, or 'B' batteries, and the other panel the 24-volt, or 'A' batteries. As already mentioned, the 132-volt batteries are charged direct from the 230-volt D.C. supply. This is done through a resistance situated at the back of the board and controlled by a shaft fitted with a hand-wheel extending through the panel to the front. The main switch is a combined no-load cut out fixed at the bottom of the panel and next to it is a 4-pole, double throw switch, two of the knife blades being of the rocker type for the purpose of changing the batteries to discharge without interrupting the supply. When the switch is in the top position, battery No. 1 is on charge (provided the main switch is at the 'On' position) and battery No. 2 is discharging. The reverse is the case in the other position. 15 ampere fuses, one for each battery, are in circuit when charging is in progress and a two ampere fuse is in circuit on the discharge side. A voltmeter, reading to 200-volts, and a 3-position switch are provided to enable the voltage of either battery to be read. A two scale ammeter, 0-20 and 0-2 amperes with 3-position switch enables the charging and discharge currents to be read.

On the right-hand panel at the bottom are accommodated the generator, battery charging, discharge switches and a fuse change over switch. All are single-pole, double-throw pattern except the discharge switches, which are of the rocker type. There are two of these discharge switches operated independently, which enable the batteries to be discharged in parallel in a case of emergency. The discharge fuses are duplicated and are connected across the center and outer poles of the fuse switch. One of these fuses is normally in circuit whilst the other is shunted by the knife blade of the switch. When the fuse blows it is only necessary to throw the switch to the other position and by so doing short circuiting the blown fuse and substituting the good one.

Two fuses, each 125 amperes, are connected in parallel in the charging circuit for each battery. A reverse-load and over-load circuit breaker is also provided in the charging circuit and is adjusted to cut at 280 amperes over-load and about 10 amperes reverse-load.

The shunt regulators for the generators are located on this panel, also a 50-volt scale voltmeter and a centre zero type ammeter reading to 300 amperes for reading the charging current to the batteries and the discharge to the apparatus.

Carrier Batteries

The 24-volt batteries, of which there are two similar sets, were supplied by the Tudor Accumulator Co., Ltd. and are arranged in two rows of 12 cells each. The appearance and construction resemble that of the exchange batteries except that no extension of the capacity is allowed for and the connections between cells are bolted instead of lead burned.

The plates are in two sections, *i.e.*—each cell has two groups of positive and negative plates. This is done in order to distribute the weight to be lifted during the process of erection of the battery.

Each cell has 19 plates—nine positive and 10 negative. Wood separators are used. The capacities of the batteries are 1,350 ampere-hours at the 10 hour rate.

The 132-volt batteries are supported on two two-tier stands placed side by side. The containers are glass boxes and each cell has three plates, one positive and two negatives—with wood separators. The connections between the cells are bolted. The capacity of each battery is 50 ampere-hours at the 10 hour rate. The negative poles of these batteries are earthed since the plates of the valves require a positive potential.

Dehydrating Plant

Humidity.—By 'humidity of the air' is meant the quantity of water it contains. This quantity is generally referred to as a percentage of the maximum quantity it is capable of retaining at that specific temperature.

The actual amount of water which may be retained by the air is dependent upon the temperature. Thus, air at 90°F. can hold more water than air at 50°F. At each degree of temperature, the maximum quantity of water held by the air is 100 per cent. If, therefore, air at 90°F. is reduced in temperature to 50°F., water will be discarded and the air at this new temperature will be at '100 per cent humidity.' If the air is now heated to 80°F. without moisture being absorbed in the process, it will be at a humidity of something less than 100 per cent, since it is capable of absorbing moisture. This is the principle involved in 'dehydrating' or as it is sometimes called 'dehumidifying.'

Necessity for Dehydrating.—From the foregoing it will be seen that there is much less moisture in the air in a cold climate than in a hot climate with a humidity of, say, 90 per cent in each case.

The effect of water or moisture on cables, wire and electrical apparatus generally, is to lower the insulation resistance, due to damp penetrating the cables, coil-windings, etc., or to the formation of a film on the apparatus and permitting surface leakage to take place. Again, when cables or apparatus are subjected to an electrical pressure, leakage due to damp may produce electrolysis.

In a tropical, humid climate such as that of Malaya, dehydrating is, therefore, a necessity, until such times as apparatus is manufactured which will withstand the penetration of damp.

Dehydrating Plant.—The aim, as intimated above, is to cool the air, which is to be passed into the apparatus rooms, to a degree of coldness such that it will discard a large proportion of its moisture, subsequently raising the temperature such that the humidity is in the region of 60 per cent to 65 per cent.

This is done by refrigeration of the air and thence passing it through a series of heaters. Ammonia gas is used as the refrigerating medium. It is compressed to a pressure of 175 lbs. per square inch, approximately, thence delivered to a condenser, where the heat of compression is given up and the gas is liquified. From the condenser it passes through an expansion valve into a series of pipes immersed in water, the latent heat of the water is absorbed, and is thereby cooled to a temperature of about 50°F. The gas is then returned to the compressor and the same cycle of events is repeated. The compressor, condenser and the expansion piping immersed in water, (known as the evaporator), are connected by piping and form a complete circuit through which the ammonia passes, and if leakage does not take place, fresh ammonia need not be added. Figure 2 shows the cycle of events in the case of the ammonia and the air drying process.

The condenser consists of a large cylindrical tank in which are circular coils of pipes. The pipes carry the ammonia, and the tank itself is fed with a water supply drawn from the town mains and taken off through a waste pipe. About 1,300 gallons per hour are used when the plant is in operation.

The evaporator is a large enclosed tank into which two large ducts are led in at opposite ends and by which the air, undergoing dehydration, enters and leaves. In the bottom of the tank the ammonia expansion pipes are laid, submerged in circulating water, and above this are ranged water spray pipes. The water is kept in circulation by means of a water pump, and, at the same time, forced through the spray pipes, so forming a spray above the water surface. The air is drawn through this space where it is thus cooled and washed by direct contact with the cold water.

In the air duct between the evaporator and the apparatus room is a suction fan which draws the air through the evaporator. At the same time it is heated by means of electric elements placed in the duct. These elements are controlled by three switches, so providing a temperature control. The fan motor, which is a 460-volt, D.C., shunt wound, $5\frac{1}{2}$ b.h.p. motor has a shunt regulator by which the fan speed may be varied between 675 and 1,000 r.p.m.

The ammonia compressor is a vertical, single-cylinder compressor, designed to run at a speed of 200 r.p.m., fitted with driving and loose belt pulleys 3-ft. 3-ins. diameter. It is belt driven by a Crompton Parkinson D.C. motor, compound wound, and rated at 18 b.h.p. at a speed of 950 r.p.m., and is equipped with dust-tight ball and roller bearings.

The starter for the compressor motor is fitted with a magnetically operated contactor with no-load and over-load releases.

Desiccating Plant

The desiccating plant is used for drying air and pumping it through the underground cables which are air space and paper cored—i.e. the conductors are lapped loosely with paper ribbon, so leaving an air space between them. The cables are hermetically sealed in a lead sheath. The penetration of damp into the cable lowers the resistance of the air space and paper, and faulty circuits are the result.

Even if the cause of the trouble is located it is necessary to drive out the damp, and this is done by means of the desiccator.

It consists of a vertical, single stage, single cylinder, single acting compressor, which gives an output of 27 cubic feet of air per minute at a pressure of 35 lbs. per square inch. The compressor is water jacketed, and the water supply is taken from the Town mains. It is direct coupled to a $5\frac{1}{2}$ b.h.p. compound motor running at a speed of 500 r.p.m.

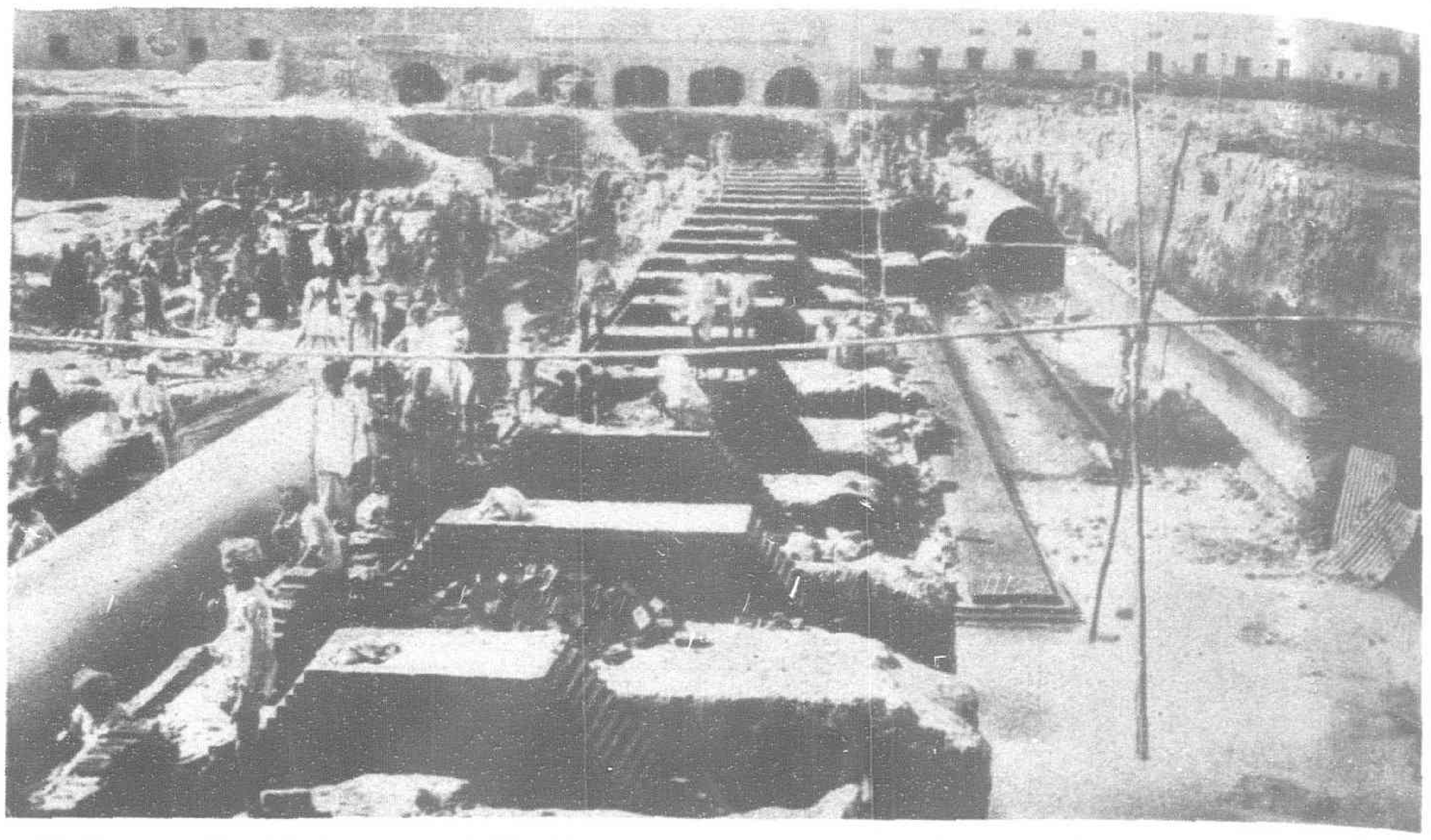
The air is sucked in through a filter which is placed in the automatic apparatus room, thus providing a supply of partially dried air at the outset.

The air is compressed to about 45 lbs. per square inch and expanded into an expansion chamber where it is cooled, and so discards a certain amount of moisture. It is then delivered into a large air receiver which acts as a buffer against the compression bursts of the compressor. From thence it is passed through three cylinders containing calcium chloride, which acts as a drying agent. A pipe is then led to the cable chamber, where it terminates in six screw couplings fitted with cocks and pressure gauges. Figure 3 is a schematic of the Desiccator showing the air drying process.

Each cable is fitted with a threaded nozzle, and connection is made from the screw couplings to the cables by flexible pipes. Air is passed through the cables at a pressure of 12 to 15 lbs. per square inch.

Notable Extensions of Water Supply System at New Delhi

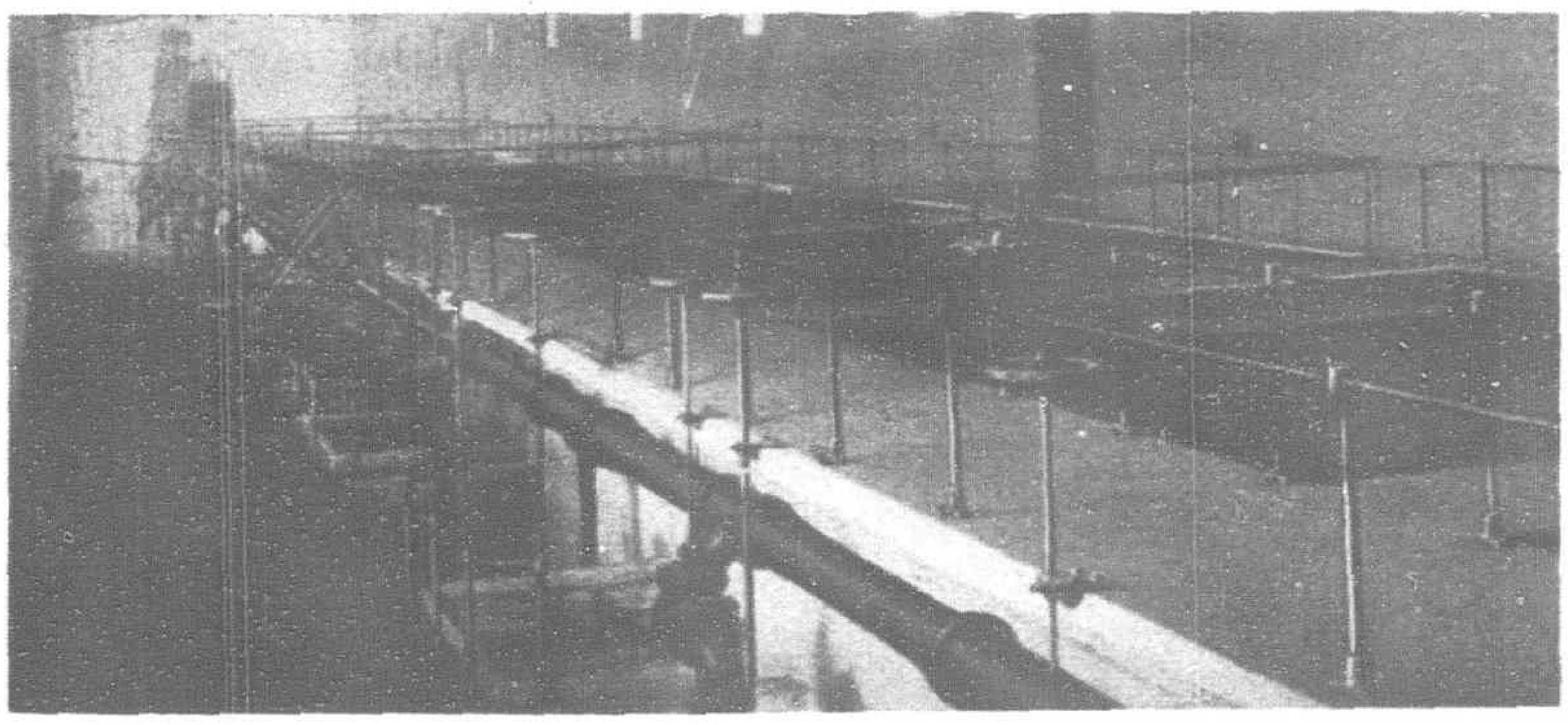
In view of the increasing attention being given to towns water supply in many different countries of the world it may be stated that some time ago the New Delhi Water Board in India arranged with the Paterson Engineering Co. (India) Ltd. to extend their existing installation of 15 rapid gravity sand filter units by the addition of five further units. These have recently been completed, bringing the capacity of the plant up to 15,000,000 gallons per 24 hours, forming the total installation of 20 filter units originally planned, constituting a notable example of the latest scientific principles.



Patterson Rapid Gravity Filtration and Purification Plant at New Delhi in course of erection

The first "Paterson" plant at New Delhi was completed in 1920, consisting of 10 rapid gravity sand filters with all the necessary auxiliary equipment in the shape of coagulation tanks and chemical measuring apparatus. A few years later this was extended by the addition of five more filters and one coagulation unit, and as a result of the present extension of five units, along with the additional coagulation tank and accessories the complete plant represents one of the largest and most up-to-date installations in India.

The raw water is taken from the River Jumna, which is a difficult proposition, not only because of the great seasonal variation in the degree of bacterial pollution but also in the silt content. However, this problem has been successfully surmounted by the use of sedimentation and coagulation tanks, and many "Paterson" plants are now in operation dealing with the water from extremely difficult rivers such as the Nile, the Ganges and the Tigris. In this connection also an interesting "Paterson" installation in India is that for the Rajahmundy waterworks in Hyderabad, having a capacity of 1,200,000 gallons of water per 24 hours, taken from the Godaveri River.

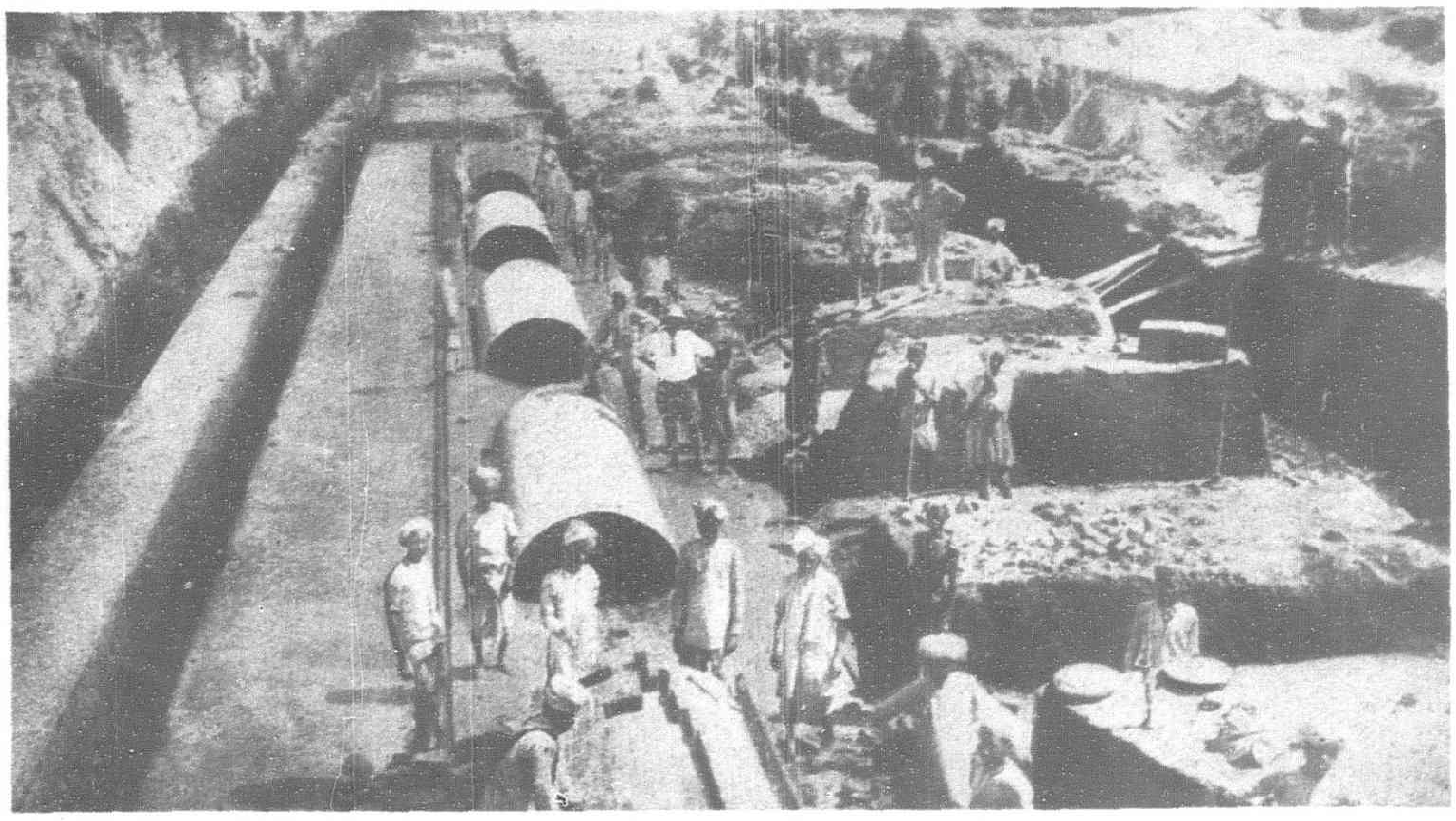


Patterson Rapid Gravity Filters at New Delhi

The general principle is to provide, if necessary, primary sedimentation tanks and then to pass the water to a coagulating tank, where it is treated with aluminium sulphate so as to remove the final particles, the separated sludge being then discharged through perforated pipes laid over the floor of the coagulating tank. The water, being now free from silt, is then delivered to the rapid gravity sand filters, which it will be remembered are cleaned at regular intervals by means of compressed air, which agitates the sand and removes the entangled impurities, these being then swept away in the drain by reversing the current of wash water, the same sand lasting for years.

The clear filtered water then enters the storage tanks and is treated at the same time with a measured trace of chlorine gas, using the firm's "Chloronome" apparatus and resulting in complete sterilization.

Over 2,000,000,000 gallons per 24 hours are now being treated on these lines representing not only towns water but also sewage, sewage effluents, swimming baths, and cooling water for condensers at power stations, the method having the great advantage in a tropical country that chlorine is always a 100 per cent product not affected by the climatic conditions, allowing of easy and accurate measurement unlike bleaching powder or sodium hypochlorite.



Another view of Rapid Gravity Filtration and Purification Plant at New Delhi in course of erection

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Low-Temperature Carbonization

The South Manchuria Railway Company announces that, after five years of research, a new method of low-temperature carbonization has been perfected by which one ton of heavy oil can be produced from two tons of coal. The product is stated to be good fuel and capable of being cracked for gasoline.

The Japanese Naval authorities have been assisting in this work, which is aimed to seek new fuel sources independent of American, British and Dutch supplies. The chief source of this new fuel is expected to be the great Fushun open-cut coal mine in Manchuria, owned by the railway company, where coal at the pit-head is stated to cost less than 50 American cents a ton. For some years oil has been extracted from shale found in the Fushun coalfield.

A Year's Progress in Transportation and Communications in China*

THE National Government of China* can be congratulated upon a great success in at least one section of its reconstruction program. In spite of financial depression and grave political difficulties, an enormous sum was appropriated last year for the improvement of communication and transport services, and compared with the previous year the progress made in 1933 in connection with railways, highways, shipping, aviation, telegraph, radio and postal services was remarkable. The present review supplies some brief details of achievements in various directions.

Railways

The work done in connection with railways was in two directions, constructional and administrative. With regard to the former, the most important achievements were as follows :—

Resumed Construction of Canton-Hankow Railway.—This line, in conjunction with the Peiping-Hankow railway, touches three of China's largest rivers, the Huangho in the north, the Yangtze in the center, and the Hsikiang in the south. The section between Shiuchow, Kuangtung, and Lukou, Hunan, a distance of about 800 *li*, however, has not been completed, leaving a considerable portion of a rich area undeveloped. With a view to resuming construction of this line, the Ministry of Railways established a special bureau charged with the task of completing the unfinished section between Shiuchow and Lukou, but owing to financial difficulties nothing of real importance could be done until last year, when in August, the section between Shiuchow and Lokchong, a distance of 50 kilometers, was opened to regular traffic, while by the end of the year the construction of tunnels, permanent way, piers, and spans for the section from Lokchong to Tashimen, a distance of 45 kilometers, was in full progress. The whole line is expected to be completed in about two years.

Extension of the Lung-Hai Railway.—This line, when completed, will traverse the four provinces of Kiangsu, Honan, Shensi, and Kansu (or Szechuan as recently proposed), forming a trunk line connecting East and West China. So far, however, less than half the line, from Tapu to Tungkuan, 900 kilometers, has been opened to traffic. Construction of the section between Tungkuan and Sian was put in full swing last year under the supervision of a special administration. To facilitate the work, this section was divided into three parts : Tungkuan-Huachow, a distance of 47 kilometers ; Huachow-Weinan, 26 kilometers ; and Weinan-Sian, 59 kilometers. The road-bed has been almost completed, and rails and other construction material are ready for use, and it will not be long before the opening of the road to traffic.

To facilitate coal transportation, a branch line is in course of construction from Taierchuang, where the Chung Hsing colliery is situated, to Chaotun, near the Grand Canal, a length of 30½ kilometers.

Another enterprise of great importance to the future development of the railway was achieved at its eastern terminus, where the line touches the Linhungho, which runs into the Yellow Sea. At Tapu, the railway had a wharf, facilitating connection between land and water transport, but the Linhungho has been so silting up that the wharf can no longer be approached by large ships. Accordingly, a new wharf must be constructed elsewhere to replace the old one, and an ideal site for this purpose is between Hsilien Island and Laoyao. The original plan for harbor works at this place was so extensive that it was far beyond the means of the railway to carry it out, and the management decided upon an alternative scheme and started to build a temporary wharf and small breakwater, while an area 260 kilometers wide and 1,050 kilometers long was dredged below the wharf. Even this modest scheme required an expenditure of $3,000,000, which was covered by a Netherlands loan raised in May, and a period of 18 months was assigned to complete the work.

With a view to connecting the railway with the new wharf, an extension of 28 kilometers from the former eastern end, Hsinpu, to Laoyao has been made, of which 21 kilometers were completed and opened to traffic last year.

Nanking-Pukow Train Ferry.—Plans to establish a railway ferry across the Yangtze connecting Nanking with Pukow, linking the Tientsin-Pukow and Nanking-Shanghai lines and affording through passenger and freight service between North and South, have been discussed for many years, but it was not until last year that the scheme finally materialized and on October 22 the first train was carried across the river by ferry.

Completion of Kinghua-Yushan Section of the Hangchow-Kiangshan Railway.—It is 165 kilometers from Kinghua to Yushan via Tangchi, Lungyu, Chühsien and Kiangshan. Construction expenses, amounting to $6,110,000, were covered by a loan of £200,000 from the Board of Trustees for the Administration of Sino-British Boxer Indemnity Fund, and $2,500,000 from four Hangchow banks, the balance being met by the surplus from the sale of the Hangchow power-plant. To facilitate construction, the section was divided into two main parts, which were subdivided into eight small divisions. Building was commenced in November, 1932, and the work proceeded so fast that in July last, the laying of rails was started. October 10 saw the completion of the Kinghua-Lungyu division, and 20 days later the first train was seen at Chuhsien, the whole line being completed by December. With such a remarkable achievement within 12 months, the Reconstruction Department of the Chekiang Provincial Government has every reason to be proud of its efficient personnel and of the successful financial arrangements made, which called for no small enterprise and patience on the part of the provincial authorities.

Survey of the Yushan-Pinghsiang Line.—This line is to be extended from Yushan, the southern terminus of the Hangchow-Kiangshan railway, to Nanchang, in Kiangsi province, whence it is to be extended again to Pinghsiang and connect with the Canton-Hankow railway via the Chuchow-Pinghsiang Line. A preliminary survey of the section between Yushan and Nanchang was completed last year, though no details for construction have yet been drawn up, there being financial considerations which must be dealt with before engineering problems are tackled. It is estimated that it will cost approximately $23,600,000 to build this line if the standard set by the Ministry of Railways for China's national railways is to be followed.

Improvements on the Kiaochow-Tsinan Railway.—While an enormous amount of money was spent in improving railways generally, particular attention was paid to the reconditioning of the Kiaochow-Tsinan line, which crosses a great part of Shantung province from west to east. For this railway alone China spent last year $1,300,000 on the replacement of sleepers. Bridges were reinforced and light rails replaced with heavy ones.

On the administrative side of railway work, much was done last year for the benefit of farmers, factories, mining concerns, etc., and many new measures were introduced to ensure better facilities for passenger and freight traffic. The following are some typical examples :—

Reduced Freight Charges for Agricultural Products.—With a view to regulating food supplies and thus bringing effective relief to the rural population, special reductions were made in freights for carrying agricultural products on the following railways :

Tientsin-Pukow.—Rice in carloads from Pukow to Tientsin, wheat from Yenchow, wheat flour from Pengpu to Tientsin, and wheat flour from any station to Tungkuan, Shensi.

Lung-Hai.—Wheat flour from Haichow to Tungkuan, and millet from any station westward.

Peiping-Hankow.—Rice in carloads from any station northward, wheat flour from Chengchow to Tungkuan, peas in carloads, and wheat from any station.

Kiaochow-Tsinan.—Wheat flour in carloads from any station eastwards, and peas and various kinds of vegetable foodstuffs other than rice and wheat from any station.

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* *The Chinese Economic Journal*

Hunan-Hupeh.—Rice in carloads.

Nanchang-Kiukiang.—Exported rice.

Taokow-Tsinghua.—Wheat in carloads and various varieties of foodstuffs.

Peiping-Mukden.—Foodstuffs in carloads.

Peiping-Suiyuan.—Wheat bran, beans, and other foodstuffs.

Nanking-Shanghai and Shanghai-Hangchow.—Foodstuffs of various descriptions.

Reduced Freight on Chinese Factory Products.—To encourage domestic manufacturers, the Ministry of Railways granted special freight rates for the products of many factories, including the Tien Yuan Electro-chemical Works, the Kai-Cheng Acid Manufacturing Co., the Po-Hai Chemical Works, the Wing On Cotton Mill, and the Eastern Asia Wool Manufacturing Co. Easy terms were also arranged for the transportation of cocoons, natural silk, cotton-yarn, slate-pencils, etc.

Special Facilities for Coal Merchants.—Coal is now practically the only important mineral China produces, but suffers most severely from foreign competition. In order to relieve Chinese merchants from part of the burden of freight charges, the Ministry of Railways has classified coal in grade 6, together with earth and sand. Freights still appearing too high, in view of the very low prices at which imported coal is offered, the Ministry last year made a further reduction of coal freights, but the discounts given by different railways vary slightly, as follows :

Kiaochow-Tsinan.—20 per cent off schedule rate for coal to be exported, and 10 per cent off for domestic supplies.

Peiping-Hankow.—20 per cent off for coal exported from Hankow, Peiping, and Fengtai, and 10 per cent for supplies for home consumption.

Peiping-Suiyuan.—The freight for Shansi coal to be shipped abroad was reduced to $3.70 per ton.

Hunan-Hupeh.—80 per cent off for long-distance transportation and 10 per cent off for short-distance.

Improved Facilities for Passenger and Freight Traffic.—Considerable progress was made last year in this direction. Firstly, in order to assist merchants in selecting goods to sell, and instructing them as to what constitutes a right movement of goods, an exhibition of products of the railway zones was held under the auspices of the Ministry of Railways. Secondly, for the benefit of shippers, the Government Railways started to accept consignments on a C.O.D. basis. Thirdly,with a view to encouraging the use of railways for transporting perishable goods, the Ministry is preparing to equip Government railways with refrigerator-cars, allowing special rates to shippers of goods forwarded in this way.

Nor did the Ministry omit to give attention to matters affecting the convenience and comfort of passengers. Several railways issued round-trip excursion tickets at 75 per cent of two single fares. The Nanking-Shanghai Railway instituted a special passenger and goods service which provided similar improved facilities for ordinary traffic. Lastly, an extensive system of through traffic was introduced, which includes almost every Government railway, a task calling for no small courage on the part of the Ministry of Railways, as this is the first scheme of its kind attempted in China.

Highways

Another significant aspect of China's modernization in connection with communication and transportation is high-ways construction, which proceeded last year with unprecedented rapidity. Road after road was opened, and a network of highways is developing all over the country. Very important work in this direction was achieved by the National Economic Council, which put into operation the " Seven-Province Program " for linking the highways of Honan, Hupeh, Anhui, Kiangsi, Kiangsu, Chekiang and Hunan. During the past decade a considerable mileage of motor-roads has been completed in various provinces, but owing to lack of co-operation among the provincial authorities, there was much waste of funds and energy due to the unequal distribution of such roads in the various provinces. It was to avoid this fault in the old independent system, as well as to accelerate the progress of road-building, that a Bureau of Public Roads was established under the National Economic Council in January 1932. A new plan has been drawn up which aims at the construction of 8,948 kilometers of new roads in the immediate future. The following schedule shows the progress of construction work from November 1932 to December 1933 (figures denoting distances in kilometers) :—

Roads Completed

	Main	*Branch*	*Total*
Honan	167.00	448.00	615.00
Hupeh	54.00	234.00	288.00
Anhui	472.00	147.00	619.00
Kiangsi	887.00	257.50	1,144.50
Kiangsu..	66.00	192.00	258.00
Chekiang	102.00	266.00	368.00
Hunan	—	—	—
Total	1,748.00	1,544.50	3,292.50

Roads Under Construction

	Main	*Branch*	*Total*
Honan	119.50	—	119.50
Hupeh	230.00	116.00	346.00
Anhui	127.50	36.50	164.00
Kiangsi	270.90	289.00	559.90
Kiangsu..	120.00	162.00	282.00
Chekiang	282.00	338.80	620.80
Hunan	189.00	318.00	507.00
Total	1,338.90	1,260.30	2,599.20

Proposed Roads

	Main	*Branch*	*Total*
Honan	343.20	57.00	400.20
Hupeh	214.00	262.40	476.40
Anhui	370.00	190.00	560.00
Kiangsi	227.50	215.00	442.50
Kiangsu..	421.00	303.00	724.00
Chekiang	50.00	—	50.00
Hunan	331.00	73.00	404.00
Total	1,956.70	1,100.40	3,057.10

Total

	Main	*Branch*	*Total*
Honan	629.70	505.00	1,134.70
Hupeh	498.00	612.40	1,110.40
Anhui	969.50	373.50	1,343.00
Kiangsi	1,385.40	761.50	2,146.90
Kiangsu..	607.00	657.00	1,264.00
Chekiang	434.00	604.80	1,038.80
Hunan	520.00	391.00	911.00
Total	5,043.60	3,905.20	8,948.80

Among the numerous motor-roads completed last year in various provinces, the most important are the Hangchow-Huichow, Nanking-Wuhu, Hsuancheng-Changhsin and Soochow-Chiahsing highways, a total distance of about 640 kilometers, or 400 miles.

Prior to the building of the Hangchow-Huichow Highway, it took from five to ten days to get from Hangchow to Huichow by water, and three days to cover the distance in the opposite direction, but the new road brings these two important cities within eight hours of each other. Not only is the transport of local products, such as tea, fruit, etc., to outside markets greatly facilitated, but many attractive scenic spots in parts of Anhui previously accessible only with difficulty can be now reached quite easily.

The Nanking-Wuhu highway, about 92 kilometers in length, constructed under the direction of the Honan-Hupeh-Anhui bandit-suppression forces, was opened to traffic on New Year's Day, 1933. This is a great achievement, as before the completion of this road small steamboats were practically the only means of transportation between the capital and Wuhu.

Means of communication in Southern Anhui are far from adequate. Most of the districts are only accessible by trails across the mountains or by narrow and rapid streams. With the exception of a few ports on the Yangtze, such as Wuhu, Taiping, etc., which enjoy transport facilities afforded by the great river and are not in urgent need of modern highways, the districts further south, being situated far away from the Yangtze, can reach the outside world only through certain parts of Chekiang. There are several ways by which a traveller from Southern Anhui can get to Chekiang. To the north there is an overland route from Hsuancheng to Changhsing by way of Kuangteh and Ssuan. The greater part of this route, however, lies through mountainous regions, admitting of no wheeled traffic. It was through the efforts of Government authorities that the two towns—Hsuancheng and Changhsing—are now connected by a motor road of 124 kilometers, which was completed last year, the Chekiang section from Szean to Changhsing being originally built for facilitating troop movements. As Changhsing is on the Hangchow-Nanking highway, travellers from southern Anhui can now avail themselves of motor-transport after crossing the Chekiang border.

The Soochow-Chiahsing highway, 76 kilometers long, is the fourth of the network of roads constructed in 1933. Though its surface can not compare in smoothness with the asphalte-covered roads of Shanghai, the new road serves to connect two of the most interesting cities in the provinces of Kiangsu and Chekiang, which are important both as industrial centres and as beauty spots, particularly Soochow, which is known among the Chinese as "paradise on earth."

The new highway runs almost due north from Chiahsing, on the west of the Grand Canal, with occasional bends to reach important market towns between the two cities. While it takes an ordinary house-boat more than a day and steam-launches at least six hours to complete the trip through the Grand Canal, one can now ride comfortably by motor-bus from Soochow to Chiahsing in three hours.

The following tables, taken from the National Good Roads Association, show the progress of road-building during the past 15 years and the length of roads in different province at the end of 1933:

PROGRESS OF ROAD-BUILDING AS SHOWN BY YEAR.

Year	*Length in Kilometers*
1921	1,158
1922	8,000
1923	13,611
1924	16,000
1925	23,333
1926	26,111
1927	29,170
1928	30,550
1929	34,444
1930	46,666
1931	66,111
1932	80,899
1933	98,161

RECORD OF ROAD-BUILDING AS SHOWN BY PROVINCE.

(Figures as of 1933)

Province	*Length Projected (kilometers)*	*Length Completed (kilometers)*
Kiangsu	6,125.15	4,907.76
Chekiang	6,748.00	3,285.46
Anhui	3,247.00	1,551.00
Kiangsi	2,535.00	1,223.00
Hupeh	4,963.00	1,485.00
Hunan	8,437.00	1,597.00
Szechuan	5.419.00	4,698.00
Fukien	4,409.61	1,936.17
Kuangtung	30,079.00	7,962.00
Kuangsi	8,999.00	6,531.00
Yunnan	7,244.00	1,344.21
Kuichow	7,030.70	1,752.00
Hopei..	6,032.10	3,062.50
Honan	4,435.00	2,426.00
Shantung	39,538.00	23,868.00
Shansi	7,730.00	2,760.00
Shensi	5,539.09	1,412.00
Kansu	7,685.58	2,908.00
Chinghai	10,498.00	1,104.00
Ninghsia	3,303.00	1,977.00
Suiyuan	3,871.00	2,410.00
Chahar	4,954.00	3,898.00
Jehol..	4,613.00	2,318.00
Liaoning	3,454.00	2,329.00
Kirin..	4,759.00	2,044.00
Hailunkiang	2,340.00	1,995.00
Sinkiang	3,553.00	1,317.00
Mongolia	7,655.00	2,528.00
Sikang	2,839.00	554.00
Thibet	8,764.00	926.00
Total	227,772.39	98,161.52

Shipping

Two important developments marked the progress of China's shipping last year—nationalization of the China Merchants' Steam Navigation Company, and centralized control of shipping. The China Merchants' is still the premier shipping concern in China, though it has been losing ground since 1912, largely due to the country being in the grip of political disturbances, with the company frequently called upon to surrender its ships for transport service and also to contribute money to the war-chest. When the Ministry of Communications took over control last year, the Company was living entirely on the grace of its creditors, being in debt to the extent of more than $22,000,000. Though still in possession of valuable assets in the shape of land and buildings, this property was heavily mortgaged, and many of its ships were either obsolete or in urgent need of repair. The company had wharves and godowns at different ports, but most of them were old and have been allowed to deteriorate.

The company was in a state of insolvency rather than actual bankruptcy, as the value of its real estate holdings alone amounted to several times the total indebtedness. The concern was not without hope of rehabilitation if a well-defined plan of re-organization could be put through, and with this object in view the Government took control of the management, and determined to work out a plan for putting the enterprise on a business-like basis. During the five months from December, 1932 to April, 1933, the Government was successful in acquiring through the Central Bank of China 39,382 "sets" of shares of the Company, leaving only "2,025" sets outstanding. A special committee of experts was appointed charged with the function of readjusting the Company's liabilities. Wharves and godowns were repaired, and a reconstruction scheme involving the expenditure of $8,000,000 was framed. In view of the fact that most of the company's fleet were old ships of obsolete type, unable to compete with the modern and well-equipped vessels of its foreign rivals, the Central Political Council in May authorized the company to arrange a loan of between £360,000 and £400,000 from the Board of Trustees for the Administration of the British Boxer Indemnity Fund, for building and buying new ships, which are urgently needed to strengthen the present lines of the company and start new services. With this money at its disposal the China Merchants' Company was in a position to start an expansion plan, involving the construction of four additional liners for its Shanghai-Hongkong service, and three river steamers to be employed between Shanghai and Ichang.

The first year of State control of this premier Chinese shipping enterprise saw a noticeable improvement in the company's revenue, which amounted to more than $3,660,000 for the first six months. As compared with the first two quarters during the four preceding years, freight receipts increased by 29 per cent, and revenue from passenger traffic and godown charges rose by 44 and 32 per cent respectively. This is an achievement which will have a great affect on China's shipping as a whole, as the China Merchants' is the only Chinese-owned concern of any size engaged in this line of activity.

The second important reform carried out by the Government in connection with navigation was the gradual realization of centralized control of shipping. Since the establishment of Navigation Bureaux three years ago, there had been frequent disputes between the bureaux and local authorities concerning their respective rights in matters of shipping-control, there being no definite distinction made between deep-sea and inland navigation, of which the former came within the jurisdiction of the Bureaux. Accordingly, in

February last year the Ministry of Communications issued orders by which the term " sea-going navigation " was clearly defined, and the various Bureaux were vested with complete control over all ships plying in deep water to which the Admiralty Law could apply. Again, in August, to further ensure complete control of deep-water navigation, the Ministry declared 46 ports (Shanghai, Nanking, Haichow, Chinkiang, Nantung, Ningpo, Haimen, Wenchow, Wuhu, Anking, Tientsin, Chinwangtao, Luanhokou, Tsingtao, Weihaiwei, Chefoo, Lungkou, Yingkou, Hulutao, Antung, Canton, Samshui, Kongmoon, Swatow, Tungon, Pakhoi, Hoihow, Wuchow, Nanning, Foochow, Amoy, Chuanchow, Santuao, Hankow, Shasi, Ichang, Changsha, Yochow, Kiukiang, Hukou, Wanhsien, Chungking, Harbin, Hulin, Lungkiang and Taheiho) as principal ports, where Navigation Bureaux or their branches had complete control over ships entering and clearing those harbors.

Another accomplishment in the matter of shipping control was China's success in preliminary negotiations with foreign Ministers, especially the British and American, for the enforcement of Chinese jurisdiction over foreign shipping. Arrangements were made for foreign shipping interests operating in Chinese waters to have their vessels surveyed by Chinese inspectors, instead of by foreign inspectors, as allowed under the treaties of extra-territoriality.

Aviation

Realizing the backwardness of commercial aviation in this country, serious efforts have been made during the last few years by the Chinese Government to follow foreign countries in the active planning of mail and passenger services.

In 1933 great strides were made in the unification of China by means of air-lines. In the field of civil aviation the China National Aviation Corporation and the Eurasia Aviation Corporation represent all that is being done in China at the moment. They are complementary to each other, not rivals, with different spheres of operation, and to some extent, different aims, as their names to some extent indicate. The China National Corporation is more concerned with developing air communications within China, while the Eurasia Corporation's main purpose is to establish a direct service with Europe. Prior to 1933 the C.N.A.C. operated three lines, and the Eurasia, two lines, as follows :—

I. *China National Aviation Corporation :*
   (1) *Shanghai-Hankow*—This line was inaugurated in 1929 with a daily service except for Mondays, but is now daily. Stopping places and aerodromes are situated at Nanking, Anking and Kiukiang.
   (2) *Hankow-Chungking*—Inaugurated in May, 1931 this service at first only reached as far as Ichang, and was extended to Chungking in October the same year.
   (3) *Nanking-Peiping*—This service was opened for a brief period, April to December, 1931.

II. *Eurasia Aviation Corporation :*
   (1) *Shanghai-Manchuli*—This was the first service opened by the company, inaugurated in May, 1931, but operated for only a short time, as the Japanese invasion of Manchuria forced it to be discontinued.
   (2) *North-Western Line*—began regular operation in December, 1932, with three sectional services.
      (*a*) Shanghai to Lanchow, via Nanking, Loyang, Sian. Weekly service.
      (*b*) Peiping to Loyang. Fortnightly service.
      (*c*) Lanchow to Urumchi, via Suchow and Hami. Fortnightly service.

At the commencement of 1933 efforts were made by the C.N.A.C. to complete operations on the three main air routes in China. Accordingly the Shanghai-Peiping Line, via Haichow, Tsingtao and Tientsin was inaugurated on January 10, followed by the opening of the Shanghai-Canton and the Chungking-Chengtu line on October 24 and November 11 respectively. At present the C.N.A.C. operates three routes, the Yangtze River route from Shanghai to Chengtu, the Northern Route from Shanghai to Peiping, and the Southern route from Shanghai to Canton, covering a total distance of 3,050 miles.

While the Shanghai-Peiping line, with Peiping, the ancient capital, as its terminus, has special historical attractions, the lines to the west and south contribute considerably to the actual unification of China. The line between Shanghai and Chengtu links up the new China, represented by Shanghai and the coastal and Yangtze cities, with a great interior province which lacks even railways. Szechuen, separated from the districts further east by mountains and the Yangtze gorges, is China's most populous province, with over sixty million inhabitants. Chengtu is its capital, and the linking of that city with Nanking and Shanghai by air—now only two days from Shanghai, with 10 hours actually in the air, as against about a month by river—will be of tremendous political and economic importance.

The line between Shanghai and Canton is of significance in a somewhat different way. Here there is the linking, for the first time, of various cities along the China coast from Shanghai south, such as Wenchow, Foochow, Amoy, Swatow, and Canton, steamships usually taking three to five days to make a distance of less than 1,000 miles, as against eight hours' flying time. These ports play a special part in China's economy, Shanghai representing the greatest center of Western investment, while the cities of Foochow, Amoy, Swatow and Canton are areas with large investments abroad. A much faster means of transportation than that hitherto available is of immense value in the promotion of the mutual interests of these important centers.

Moreover, the military operations against the Communists have united different political factions in China, who now favor a common policy. The linking of Shanghai with the Southern ports by air is likely to be definitely instrumental in strengthening this tendency, and making possible a more fully national policy.

The following figures supplied by the C.N.A.C. give an idea of the popularity and rapid development of commercial aviation in China :—

		Passenger-Miles Flown	*Total Miles Flown*	*Passengers Carried*	*Kilos of Mail Carried*
1929	..	57,983	66,411	354	3,932
1930	..	330,079	638,726	2,654	17,893
1931	..	445,039	606,991	2,296	34,428
1932	..	431,145	775,036	3,153	50,851
1933	..	636,900	901,873	3,050	49,346

Telegraphs

More than fifty years have elapsed since electrical means of communication were first installed in China. With a population of more than 450 million and a territory twenty times as large as Japan, it might be assumed that telegraphy in China would equal, if not exceed, the standard of other countries, but owing to political unsettlement, coupled with military operations throughout the country for many years, development of the telegraphic system has been exceedingly slow. Very rapid advancement was made last year both in the way of readjustment of existing lines and extension of routes through the untiring efforts of the Ministry of Communications, the authorities realizing the military and economic importance of efficient telegraphic communication. The following are some of the principal accomplishments during the year :—

Opening of New Offices.—To secure a wider field of activity, the Ministry of Communications opened in 1933 twenty-five new telegraph-offices at the following places—Suichang, Juian, Pingyang, Lungchuan, Kuangyuan and Yunho, Chekiang province ; Tsungjen, Lungnan, Hsunwu, Feni, Chishui, Loan, Chinchi and Hsiaoshih, Kiangsi province ; Junghsien and Nanchi, Western Szechuan ; Hokou and Tayeh, Hupeh province ; Haiyangchen, Hopei Province ; Shangcheng, Honan province ; Tingyuan, Anhui province ; Wucheng, Shantung province ; Chienso, Yunnan province ; Kutien, Fukien province ; and Hoping, Kuangtung province.

Extension of Lines.—A long mileage of lines which had been destroyed by bandits were repaired last year, and in addition, about 5,547 *li* of new lines (including extended lines) were installed. The following table shows the work of the Bureau of International Telegraphs of the Ministry of Communications during 1933 :—

Province			*Lines Repaired* (*li*)	*New Lines Installed* (*li*)	*Extended Lines* (*li*)
Kiangsu ..	..	..	2,003	—	70
Chekiang	..	..	335	478	192
Anhui ..	..	..	568	—	—
Kiangsi ..	..	..	480	830	—
Hupeh ..	..	..	2,094	474	604

Province			*Lines Repaired (li)*	*New Linss Installed (li)*	*Extended Lines (li)*
Shantung	..	..	978	104	155
Hopei ..	..	..	1,026	504	536
Honan ..	..	..	514	368	—
Shensi ..	..	..	501	—	—
Fukien ..	..	..	240	200	—
Kuangtung	..	..	—	60	—
Kuangsi..	..	..	—	230	—
Yunnan	..	..	—	80	—
Kuichow	..	..	—	180	—
Szechuan & Tibet		..	180	140	120
Other provinces		..	—	—	222
Total	..	..	8,919	3,648	1,899

Control of Cable Traffic.—While military disturbances have been principally responsible for the failure of the Chinese Telegraph Administration to keep pace with the development of telegraphic communications in other countries, the Great Northern and Eastern Telegraph Companies' contracts with the Chinese Government also had a lot to do with the so-called "cable war" in China. The history of the Telegraph Administration is practically nothing but a record of international struggles for cable monopolies and preferential rights in China, with very little done towards the advancement of telegraph communications in this country.

With the view to overcoming obstacles in the way of China's progress in the matter of telegraphic comunications, the Bureau of International Telegraphs (Ministry of Communications) as a result of successful negotiations with the foreign interests concerned, took over on May 1, 1933 the acceptance and delivery offices of the Great Northern, Eastern Extension, and Commercial Pacific cable companies, and Chinese managers were appointed to take charge of these offices. In addition, many new conditions in China's favor were formally agreed upon between the Ministry of Communications and the three foreign companies, including cancellation of the monopolistic privileges hitherto enjoyed by the companies in the matter of landing cables. Other points were the closing of the Foochow office of the Eastern Extension Company and the Amoy office of the Great Northern Company, transfer to the Chinese Government of control of overland and under-ground wires, and recovery of the Peiping-Tientsin-Tangku-Kiakhta lines.

Radio Services

The Ministry of Communications also gave thought and took action in 1933 for the improvement of both international and domestic radio systems. With regard to the former, the change was mainly brought about by the opening of the Chenju wireless station, before the establishment of which messages to destinations abroad had to be transmitted through foreign cable companies. Prior to 1933 the Chenju station operated only eight routes to San Francisco, Berlin, Paris, Geneva, Manila, Java, Saigon and Hongkong.

A ninth service, from Shanghai to Moscow, was inaugurated on May 10 last year, and the new service is of great significance, both from the practical and political point of view. Since the rupture of diplomatic relations between China and Russia, overland telegraph communication with Russia had been interrupted, and as a result the foreign cable companies enjoyed a monopoly of the business, handling annually more than 9,000 messages of about 270,000 words. With the resumption of relations between the two countries, there are bright prospects of a rapid improvement of trade. The service now operated by the Chenju radio station diverts a considerable revenue from foreign to Chinese account, but its importance lies not only in this contribution to China's Treasury, but also in the fact that cable messages from China to Moscow pass through Nagasaki, whereas the radio service gives direct Sino-Russian contact.

There were many other noteworthy accomplishments during the year in the radio field by the Chinese Government, including the following :—

Opening of a Second Direct Service with America.—As a result of an arrangement with the Mackay Company, the Ministry of Communications inaugurated on May 19, 1933, a new trans-Pacific radio service between China and the United States. This is the second line of communication with America, and is expected to lead to the establishment of a third link, which will make it possible to transmit and receive messages direct between Shanghai and New York. So far, messages from Shanghai destined for the East Coast of the United States reach their destination in two stages—from Shanghai to San Francisco, where they are received at the central office of the Mackay Company and re-transmitted to the Mackay station in New York.

Erection of Loyang Branch Station.—Hitherto practically all international radio traffic has been handled by the Chenju station, which is, however, not protected against possible air attack. Accordingly, a branch station (20-kilowatt capacity) was constructed at Loyang, providing a safe means of communication during a period of emergency.

New Radio Service to London.—The year 1933 was also marked by the erection of a new station at Chenju for a direct Shanghai-London service. This is a beam station erected near the older station which connects China with Berlin, Paris, Geneva, Moscow, and San Francisco. Work was steadily going ahead on this important project at the close of the year (the service was not officially inaugurated until February 3, 1934). The establishment of this service represented a big step forward in Chinese communication with the outside world, being the first direct radio contact of a commercial nature between China and Great Britain, and has a significant bearing upon the trade relationship between the two countries.

Increased Domestic Service Circuits.—Realizing the importance of rapid communication between the central and border provinces, the Ministry of Communications in September established wireless connections between Sian, Shensi Province, and Peiping, Tientsin, Hankow, Lanchow, and Chengchow. This is regarded as a very important link, as telegraphic service with the North-West provinces has been suspended in many places, owing to broken or damaged wires.

Among the important stations projected or in course of erection during the year were the following : Yulin, Shensi ; Kalgan and Paotou, Chahar ; Kuihua and Wuyuan, Suiyuan ; Ninghsia, Ninghsia ; Hsining, Tsinghai ; Suchow, Kansu ; Kangting, Likiang, Paan, Tehke, and Kantsu in Szechuen and Hsikang provinces. In Sinkiang and Western Mongolia it is planned that eight transmitting stations will be established.

Postal Services

In spite of the suspension of postal services with the Three Eastern Provinces, which resulted in a decrease of China's annual postal revenue amounting to about $2,400,000, and in spite of military operations in many provinces, coupled with many other unfavorable conditions peculiar to this country, there was in 1933 a general development and expansion in most branches of postal work. This included the following plans :—

Opening of Additional Branch Offices and Postal Agencies.—During the five months from January to May 18 postal agencies were established—7 in Kiangsi, 3 in Honan, 2 each in Chekiang and Shensi, and 1 each in Shantung, Fukien, Kansu and Hopei. In addition, branch offices were opened in several districts in Kiangsu and Anhui.

Postal Co-operation with Telegraphic Offices.—In order to secure economy and attain a high degree of efficiency, the Ministry of Communications planned to bring about closer co-operation between postal and telegraphic offices, and it was proposed that Kiangsu and Chekiang should be the experimental area for such plans.

Increased Air-Mail Lines.—The development of air services in China last year has been already dealt with, and it will be sufficient here to say that there was a corresponding increase in air-mail lines in 1933. The year under review saw the inauguration of the following new services : Shanghai-Peiping via Nanking, Haichow, Tsingtao, and Tientsin ; Shanghai-Canton ; and Chungking-Chengtu. The Shanghai-Peiping service may not be regarded as altogether new, as it was operated for a brief period in 1931, but the line then followed the railway, while at present it takes a course along China's eastern coast.

Future Trends

Having made this brief survey of the work done by the National Government last year in connection with the improvement of communication and transportation services, we are in a position to estimate the general trend of future development. It appears that the Government is following entirely different policies with regard to its railway and highway programs. As to the former, it favors provincial or private construction and operation of new lines, as evidenced by the fact that, following the completion of the Hangchow-Kiangshan railway, which is entirely a provincial enterprise, most of the new lines subsequently projected or constructed are of a local or private nature. Thus, the Central Government left the building of the Tatung-Puhsien railway in the hands of the Shansi Provincial Government, and such proposed lines as Kongmoon-Yamchow, Samshui-Kongho, and Canton-Samshui. Kuangtung Province, Changchow-Amoy, Fukien Province, Taohuaping-Hungkiang, Hunan Province and Yamchow-Chungking of Kuangtung and Szechuan will all be financed by the various provinces concerned. The light railway from Wuhu to Chapu, which will soon be completed, is to be operated by a private concern. The reason for the Government adopting this policy is easy to understand—the Treasury is not in a position to finance the construction of railways throughout the country, and therefore provincial governments or private interests should take the initiative in building lines where they are considered necessary. In other words, the Government seeks to weave the provinces together in a network of railway through the efforts of local authorities. No doubt, this is the only means of reaching a quick solution of the problem, especially when the Treasury is short of funds.

However, circumstances have forced the Government to adopt the opposite policy in regard to highways. It is largely through the efforts of provincial governments that the increase in China's road mileage has been so rapid, but the fact that each province works independently has undesirable effects. First, since most of the provincial highways are built primarily in the interests of the province constructing them, there is the inevitable danger of disconnection between important commercial and industrial centers in different provinces. Each province builds roads within its own boundary, and therefore the 28 provinces of China form 28 systems, independent of each other. As a result, while small cities in the same province may be well linked, much larger centers in different provinces, between which modern motor transportation is most needed, may lack efficient connections. The second disadvantage arising from this non-co-operation between provinces lies in differences of technical standards. Roads which run in the same general direction are often not able to meet, thus causing considerable economic waste, which is easily avoidable. Moreover, since each province regards motor-roads as its exclusive property, through traffic on highways passing through different provinces is usually attended with difficulty, if not actually impossible. The tendency toward centralized control of highways as a means of remedying the defects brought about by provincial operation is manifested by the organization of a Highway Bureau under the National Economic Council, which is vested with power to build highways in various provinces. As to the telegraphic and postal services, their future development will be in the direction of intensified co-operation. Since they are both under direct control of the Ministry of Communications, it should not be difficult to prepare a plan for making these services supplementary to each other by having telegraphic and post-offices operated jointly.

Water Supply in Hongkong

(*Continued from page 410*)

Reservoir Capacity

At present (1933) the reservoir capacity on Kongkong island is about 2,400 million gallons.

Three other reservoirs owned privately by the Taikoo firms have a total capacity of 178.7 million gallons. The present reservoir capacity in Kowloon is 687 million gallons. In addition to these, storage in connection with the Shing Mun Valley scheme when completed is estimated to yield 3,000 million gallons.

The average consumption of water, that is now supplied by the Government Water Authority only, is in Hongkong about 11 million gallons per day and in Kowloon it is about six million gallons per day. The estimated population of Hongkong, is 400,000 giving an average consumption of 27.5 gallons per head per day. The estimated population of Kowloon is 287,000 and the average consumption 21 gallons per head per day. These figures apply only to that portion of the population who obtain Government supplies in the two cities.

The above figures do not include the numerous well and nullah supplies used by the population, principally for washing and domestic flushing purposes. Many of the business firms and better class private residences are fitted with a separate system for flushing and cleaning purposes, derived from their own private wells in the basement.

The Island Reservoirs

In the year 1913, there were, on the island, five reservoirs, giving a total storage capacity of about 700 million gallons when all were overflowing.

In 1932 there were eight reservoirs (as shown in Table below), giving a total storage capacity of 2,300 million gallons.

The reservoirs were at over their permanent overflow levels for the following periods:—

TABLE OF RESERVOIR CAPACITY 1932

Reservoirs	*Year Completed*	*Capacity to permanent overflow level (million gallons)*	*1932 overflow periods*
Tai Tam	1889	384.80	68 days
Tai Tam Byewash ..	1904	22.40	43 days
Tai Tam Intermediate ..	1907	195.90	101 days
Tai Tam Tuk	1917	1,419.00	65 days
Wong Nei Chong ..	1889	30.34	27 days
Pokfulum	1863	66.00	37 days
Aberdeen Upper	1931	173.23	10 days
Aberdeen Lower	1932	110.00	Nil
		Total 2,401.67	

The total quantity of water supplied on the island in 1932 was 3,517 million gallons (including 651 millions brought over from the mainland) filtered, and 53.4 million gallons unfiltered. The average consumption of filtered water for all purposes was 25.1 million gallons per head per day. The maximum quantity of water impounded in all reservoirs (exclusive of the Lower Aberdeen Reservoir) amounted to 2,291.67 million gallons in August, 1932.

This completes the story of the water supply for the island of Hongkong. The next contribution will deal with the work that has been done in order to initiate and to increase the supply to Kowloon.

A New Aspect of Manchoukuo

(*Continued from page 395*)

So much for the progress of the infant State—a start along the "Kingly Way." There is no doubt that Manchoukuo has made commendable progress in spite of the unsympathetic attitude of the Powers other than Japan. Manchoukuo, however, is too busily engaged in building up a model State to covet the favor of outside Powers and to solicit early recognition. Her present zeal is no mere show, but reality; no bid for recognition by the Powers, but the building up, preservation, and improvement of model statecraft. She believes that her achievement cannot fail to be a good example to her neighbor, China, that it will constitute a corner-stone of peace and order in Continental Asia, and will contribute to the progress of mankind. Japan, in pursuance of the Protocol of September 15, 1932, will continue to encourage the progress of the new State so long as Manchoukuo maintains the present peaceful policy. Even her neighbor, China, has recently been revising her attitude in view of the changing state of things by veering towards a more conciliatory policy, although the internal political situation does not allow the Nanking authorities to give *de jure* recognition to Manchoukuo. The future of the new State is full of promise. She will take her place in the comity of nations as a unique State founded on the ideal of the "Kingly Way," and will prove a peaceful abode for all. Manchoukuo is a State of destiny. Though despised to-day in her infancy, she will to-morrow win the friendship and respect of her compeers.

Nickel Alloy Steels in Dredging Equipment

The carrying out of dredging operations in both harbor and mining work demands the use of materials possessing exceptionally good physical and mechanical properties.

Tremendous stresses are placed upon certain parts, notably bucket pins, bushes and links. Nickel alloy steels are now extensively used for such purposes by dredging authorities throughout the world.

One of the first authorities to introduce nickel steel for parts of dredging equipment was the Clyde Trust, which adopted forged nickel steel links for dredgers before 1914. These links were forged from billets drawn down from Siemens acid nickel steel ingots, containing at least three per cent nickel.

All test pieces were required to show an ultimate tensile stress of 55 to 63 kg/mm², with an elongation of not less than 25 per cent in 50 mm. Bars 25 mm. square were required to stand bending cold through an angle of 180° over a radius not greater than 25 mm. Links, made to this specification have been in service for 18 years without failure.

Pins and Bushes

The Bombay Port Trust has been using nickel steel bucket pins for some years, the first installation having been made in a large and powerful bucket-ladder dredger named the *Silurus*, which was specially designed for tearing up virgin rock. The bucket pins on this vessel, which are 100 mm. in diameter, were made originally from another alloy steel, but as trouble was repeatedly encountered, a nickel-chromium steel pin of a type that had been supplied for use on the tin dredgers in Malaya, was installed. Other pins made from nickel-chromium steels containing molybdenum, were also tried. These pins have been in use for a period of service at least three times that of those previously used, and only one failure has occurred.

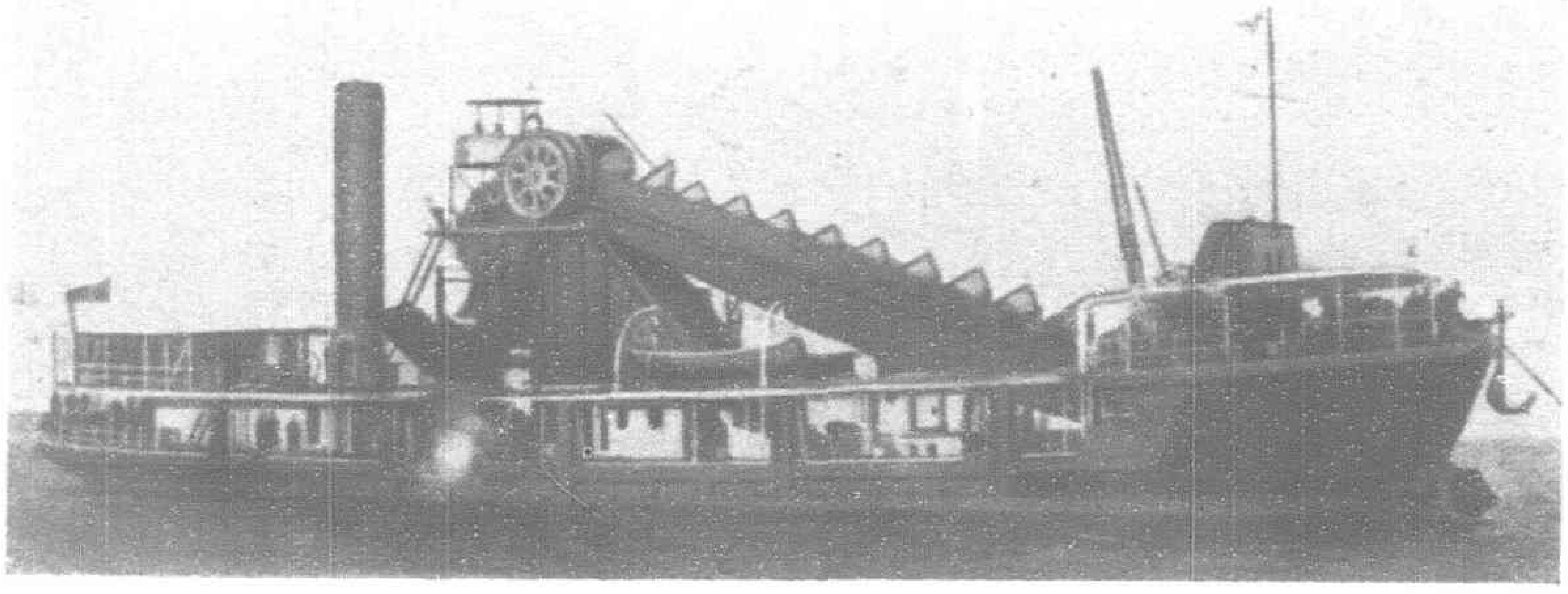


Fig. 106.—Barge Loading Dredger "Barbus" of the Bombay Port Trust. Nickel-Chromium Steel Pins used for Buckets in Hoist Gear Blocks

The chief advantages of the nickel alloy steel pins and bushes is that they have a great resistance to fatigue stresses, in addition to which they are machinable.

Part of the severity of the service to which bucket pins are exposed is due to the fact that water is the only lubricant. In Bombay, a life of twelve months was considered satisfactory for a bucket pin 100 mm. in diameter and about 500 mm. long. As there are four pins to each bucket and forty buckets on the largest dredger, it will be appreciated that the cost of pin replacements is an important factor in the maintenance of the dredger.

Nickel alloy steels are also in use as bucket pins on the dredgers used on the gold fields at Sacramento, California. Some of the largest dredgers in the world are employed on these fields and the pins, which are frequently 175 mm. or more in diameter, are usually made from nickel-chromium steel. Such pins have been used in this mining field for eleven years and have been found perfectly satisfactory.

Pins made from nickel-chromium-molybdenum steel are extensively employed in Malaya, where some 50 or more dredges are now regularly engaged in the mining of tin ore.

The first nickel alloy steel bucket pins were made in nickel-chromium-molybdenum steel and were furnished for use in a dredger operating in Far Eastern waters. Sample pins of 100 mm. diameter made of nickel-chromium-molybdenum steel were supplied in 1924.

After being in use for three years 5½ months, the nickel-chromium-molybdenum sample pins showed a wear of 8.73 mm., and the chief engineer of the dredger company estimated that the life of these pins would be about four years, as against an average of 18 months obtained from the other pins.

Since the cost of the pins made of both steels was approximately the same, the problem was merely one of obtaining that pin which would give the longest possible period of service.

Bushes made from nickel-chromium-molybdenum steel were installed as a result of the success obtained with bucket pins, and these have given equally satisfactory service.

The nickel-chromium-molybdenum steel pins were made from a steel having the following typical analysis:—

Nickel ..	.. 3.25 per cent
Carbon ..	.. 0.30 ,, ,,
Silicon ..	.. 0.20 ,, ,,
Chromium	.. 0.73 ,, ,,
Manganese	.. 0.54 ,, ,,
Molybdenum..	0.46 ,, ,,

All pins supplied were hardened and tempered, and the satisfactory results obtained were as follows:

Maximum stress	.. 116 kg/mm²
Yield point	.. 109 kg/mm²
Elongation on 50 mm	.. 17 per cent
Reduction of Area	.. 49.7 ,,
Izod Impact	.. 7.1 kgm

Tumblers

The use of nickel alloy steels for other parts in dredger construction has not been overlooked and nickel-chromium steels have been used for tumblers in dredgers operating on the gold fields in California and in Alaska. As in the case of bucket pins,

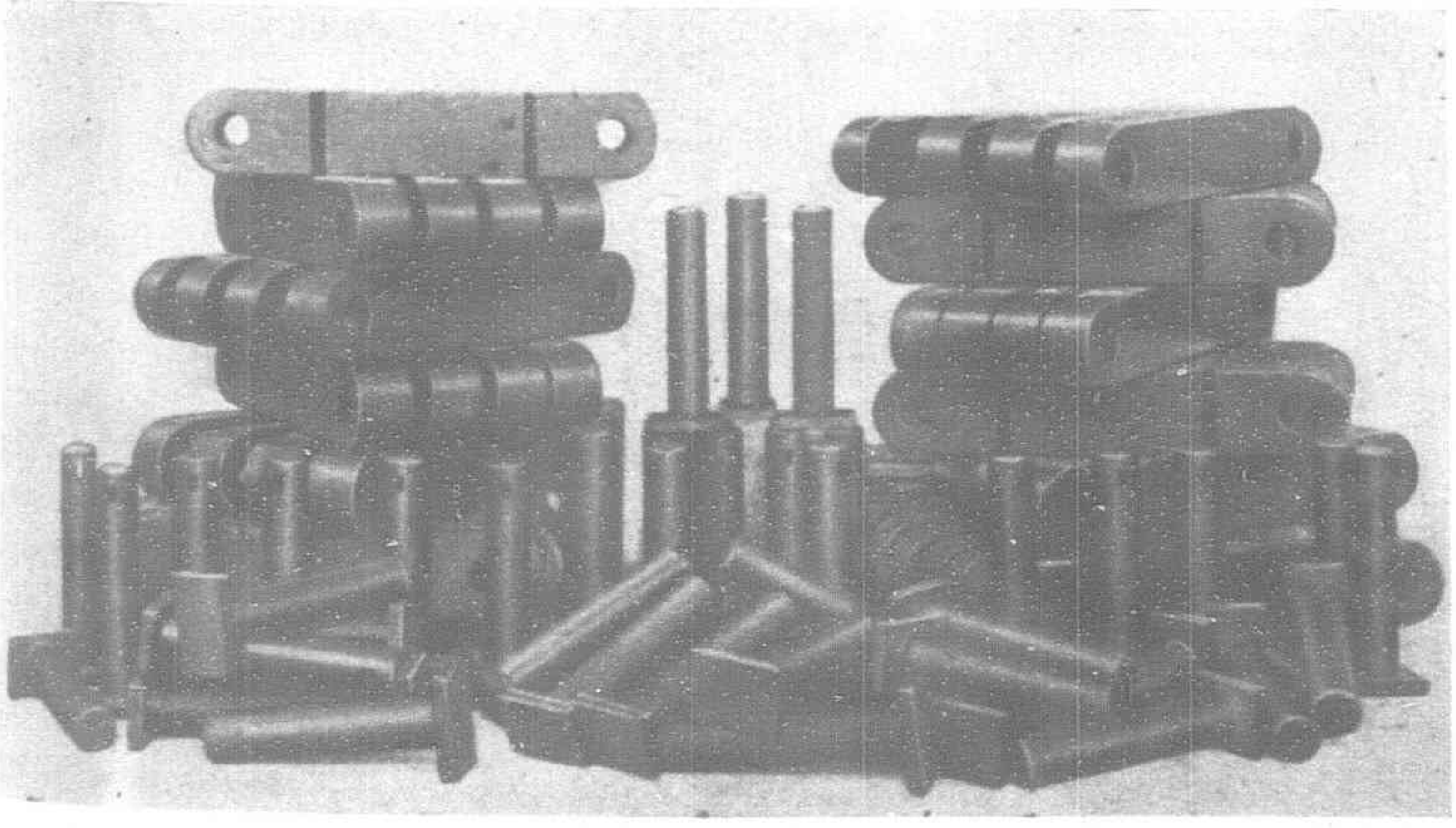


Fig. 107.—Nickel Alloy Steel in used extensively for Links and Pins for Dredgers

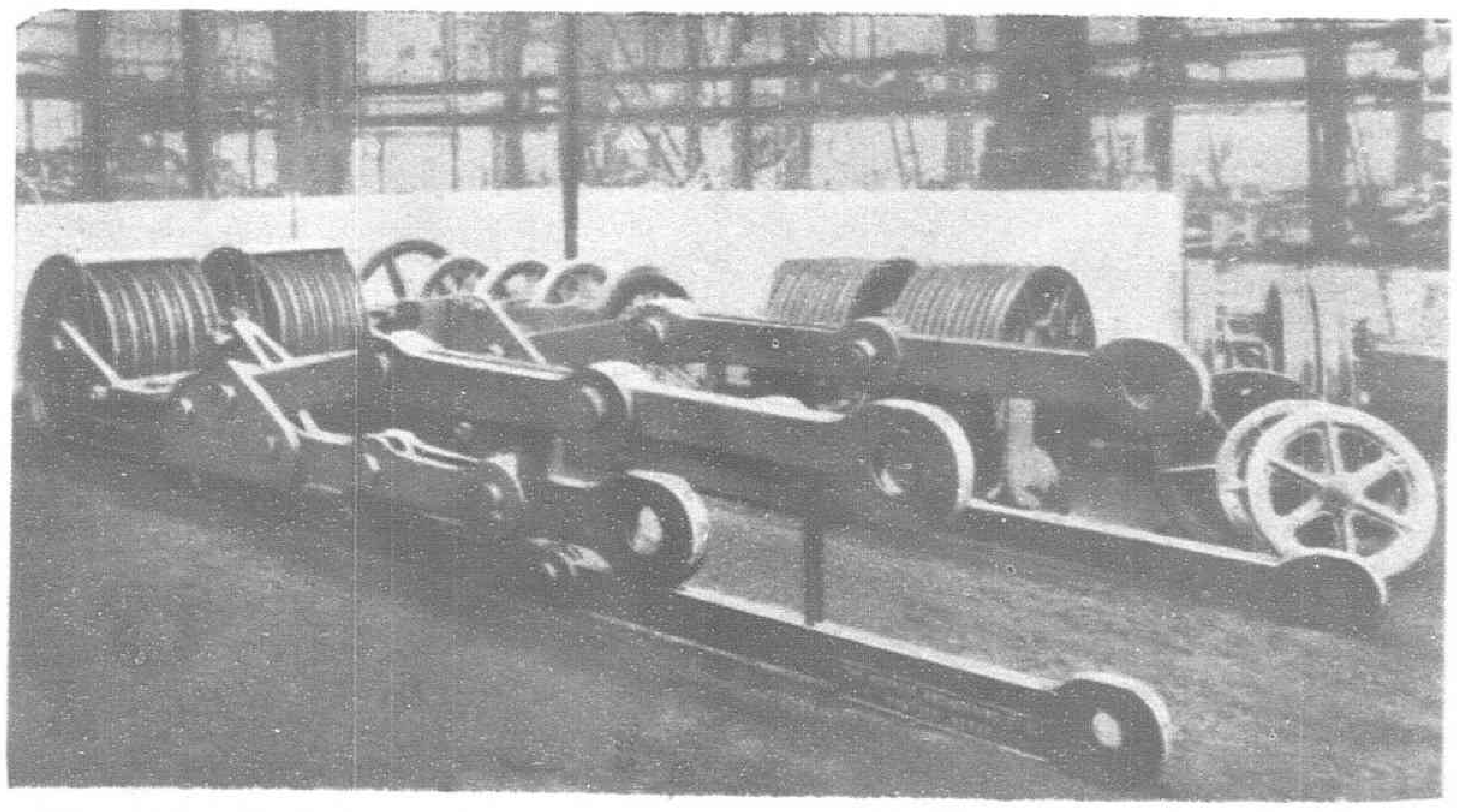


Fig. 108.—Bottom Ladder Hoist Gear for Dredger. Nickel-Chromium Steel Pins about 200 mm. in diameter used for this equipment

resistance to wear and fatigue stresses are primary essentials.

The tumblers are subjected to exceptionally severe treatment, especially the upper tumbler, which supports the entire weight of the bucket chain. In all cases the load is extremely heavy. In the case of a 7.1m^3 dredger the weight of the chain may be 250 tons, plus a fluctuating addition due to " bullocking " into hard clay, gravel, chalk, rock and moving boulders weighing many tons.

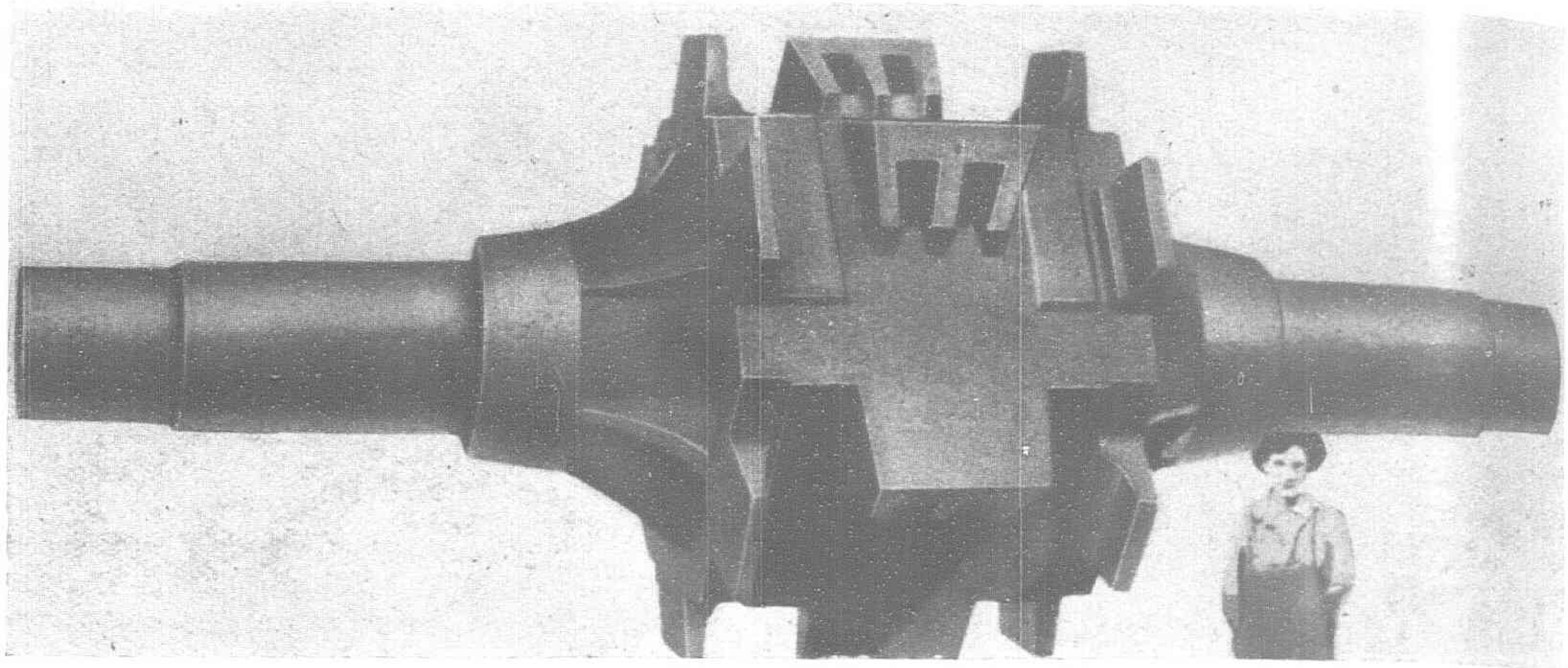


Fig. 109.—Upper Tumbler of Nickel-Chromium Steel used on Alaskan Gold Dredger

The greater toughness of nickel-chromium steels renders them well suited to the rugged nature of tumbler service. However, resistance to wear is not the sole requirement. A high yield point to resist impact fatigue stresses and adequate wearing qualities are the essentials required and these properties are available in nickel-chromium steel. Moreover, large castings in this steel are regularly produced for other purposes and the foundry technique is well developed.

Fig. 109 shows a large upper tumbler weighing about 20 tons as used on a gold dredger operating in Alaska. In turning, the upper tumbler propels the large conveyor chain, to which the buckets are attached. Its action is similar to that of a sprocket.

The lower tumblers, of which there are two to each dredger, weigh about eight tons each. Both upper and lower tumblers are made from three per cent nickel steel.

Gears

Nickel alloy steels are also used for gears employed in connection with dredging equipment. Fig. 110 shows a group of large gears which have been installed on a dredger working the alluvial platinum deposits in Russia. These gears were made from 3.5 per cent nickel steel.

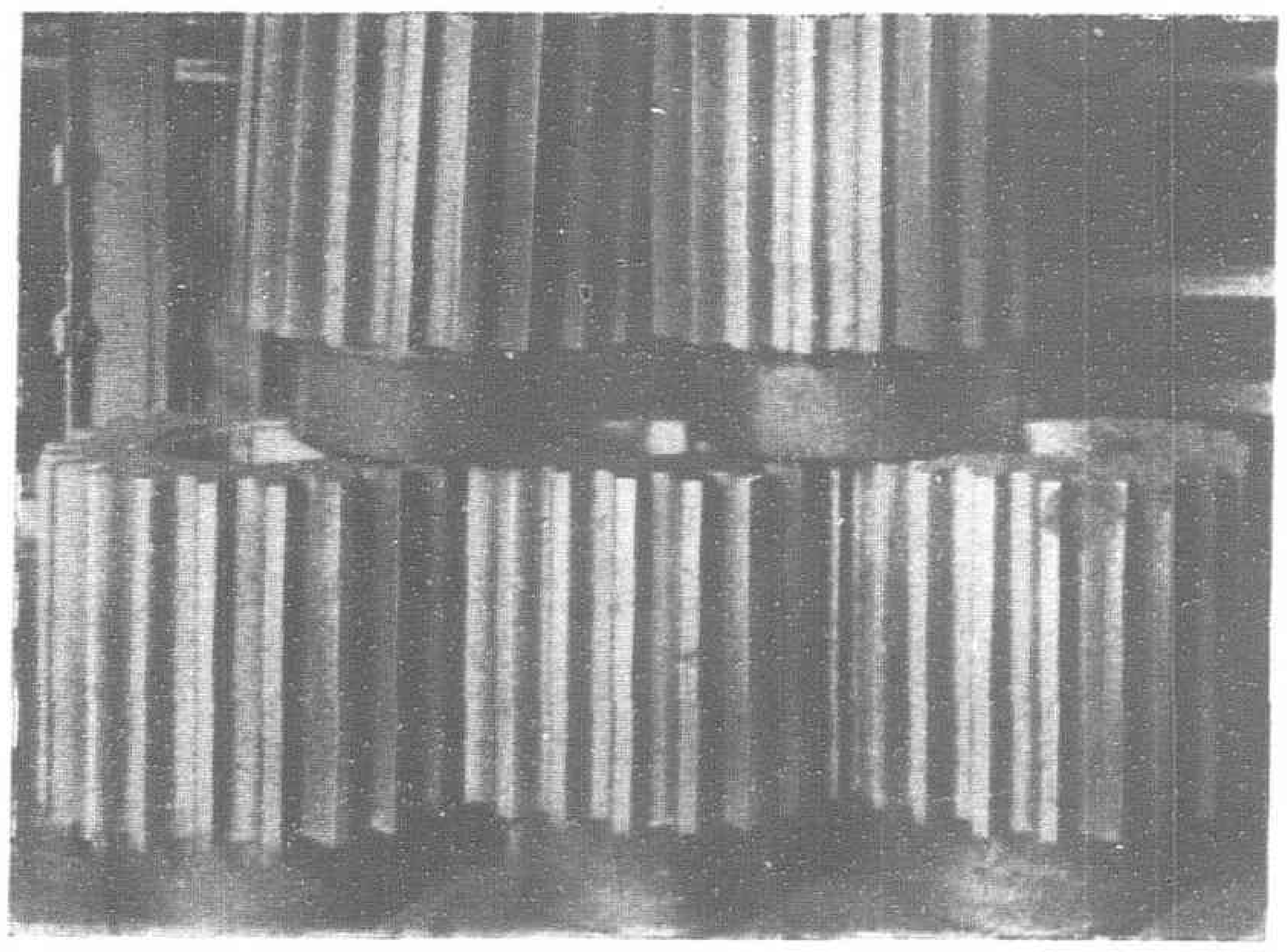


Fig. 110.—Nickel Steel Gears used on Dredgers in Russia

The value of nickel alloy steels in dredging work is now generally established. The most strenuous attempts to discover materials capable of meeting the requirements of dredging service have been repeatedly made by the authorities responsible for the maintenance of dredging equipment in the world's great ports. That nickel alloy steels have been so widely adopted, is indisputable evidence that they offer the most economical and reliable method of meeting conditions that are as arduous as any to be found in the entire engineering field.

Russia Has Vast Air Force

As a result of its progress from 1923 to date, Russia now ranks third in the world in the length of its air lines, second in respect to airmail and first in the use of aircraft in forestry, agricultural, and patrol work, the *Aero Digest* says in a recent issue. Studies prepared in co-operation with the Amtorg Trading Corporation show that during the past few years the Soviet has spent an average of $80,000,000 a year on the development of its civil air fleet and intends to spend more successfully to complete the terms of its second five year plan.

An important market for American aviation products which have already established themselves on a large percentage of the world's major air lines is expected to ensue from this development.

From the military standpoint, the commissioners of the U.S.S.R. realize the futility of a large standing army without an adequate air force.

It is sufficient to report, the survey says, " that to-day Russia has an air force which compares favorably with other powers in Europe, both in numbers and in the morale of its personnel."

Russia is taking advantage of the great possibilities in commercial aviation as embraced in transportation, photography, survey, agriculture and education, and for the second five year plan a civil aviation program has been adopted which, when completed, will result in a most exhaustive and comprehensive use of the airplane for non-military purposes.

From a meager beginning of 7,110 miles, the length of lines by the middle of August, 1933, reached 31,815 miles.

In a country so vast as the Soviet Union, the transport of air mail is most important in keeping the outlying districts in close touch with the center. During the first few months of last year, 462.3 tons of mail, more than were carried in all of 1932, were flown over regular lines.

Soviet planes carried, at the end of the first five year plan, 215.8 tons of merchandize. Valuable furs are transported from the trapping regions and, according to the All-Union Fur Co., several tens of thousands of skins were carried by air during last spring and summer from the shores of the Ob, Yenisei, and Lena rivers.

While only 2,923 passengers flew in 1923, this figure grew to 27,200 in 1932 and 31,600 in 1933.

It is in its agricultural and forestry endeavors in the air that the Soviet Union leads the world. After a modest beginning in fighting crop and animal pests from the air over an area of some 5,000 acres in 1925, this method developed to the point where an area of 2,494,700 acres was covered in 1932.

In 1932 the airplane was used in patrolling over 24,700,000 acres in forest land in fighting fires, in clearing some 1,059,630 acres of farm and forest land of injurious pests, and in sowing 143,260 acres of land. In 1933 almost 555,750 acres were scheduled to be sown.

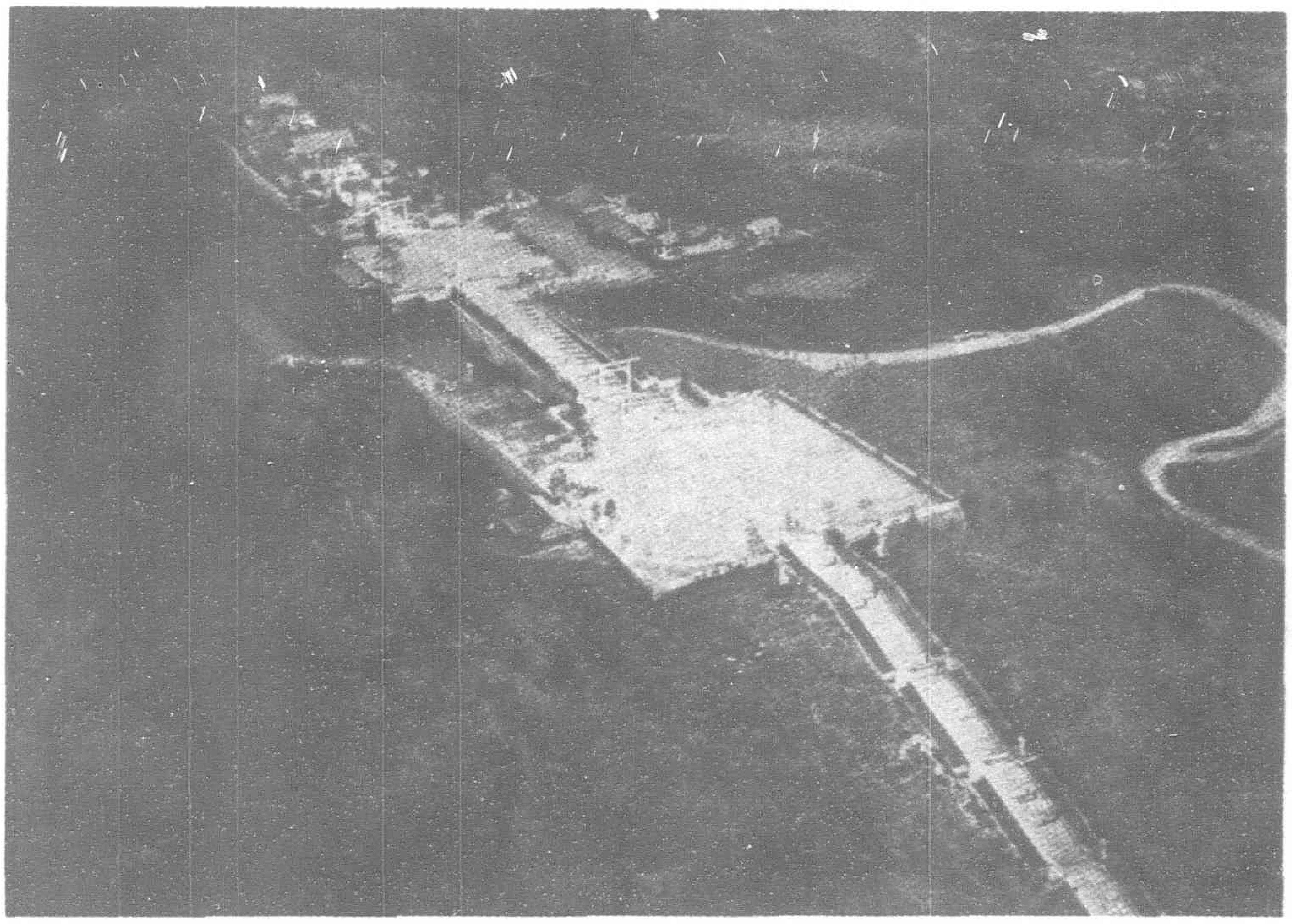
One of the most recent tests made by this fleet has been the fight against the malaria mosquito whose larvae over an area of 1,447,420 acres of water surface were destroyed in 1932, while 2,470,000 acres were scheduled for such work last year.

At present there are 15 aviation schools in the Soviet Union, where training is given in mechanics, flying, etc. Aviation clubs and glider schools have been organized in many towns and more than 7,000 persons are now engaged in the construction of gliders. In the first five months of 1933, five new schools and 110 glider stations were opened, providing a tremendous impetus to the art.

According to preliminary plans, by the end of 1937 airlines should reach 124,280 miles, 20 per cent of which will be seaplane routes. Airplane sowing by 1937 is expected to cover 7,410,000 acres of ground, 22,230,000 acres of forage grasses, and 741,000 acres of forest trees.

Improvements in Chosen*

In old Korea with all its civilization good roads were entirely lacking, and what roads it possessed were usually left in a state of utter disrepair. Even the " grand highway " from Keijo to the Chinese border was barely grand enough to admit of a cart being driven along it, so what the rest were like can easily be imagined. It is true the Korean Government used to allot certain sums of money to the various districts for purposes of road repair, but much of this it is said, went into the pockets of the local magistrates, and practically nothing was done to the roads. On the country being brought under Japanese management, great efforts were consequently put forth to improve this backward condition, and it was planned to construct a regular network of roads of three classes, of which the first and second classes were to be looked after by the Government itself, and the third by the provinces, while in urban districts all classes were to be under municipal control.



Aeroplane view of Chosen Jingu, Keijo

When repairs were undertaken in former times, corvee or compulsory service was always used and this was continued even into the new régime by conscripting those persons unable to pay their assessment. In addition, the land owners were often induced to surrender land for roads free of cost. But this is now changed, for in 1919 it was prescribed that in the making of roads at national expense corvee should be dispensed with, and the land needed purchased at a fair price, though in the case of roads at provincial cost the old practice was still retained in force in consideration of its special connection with local interests.

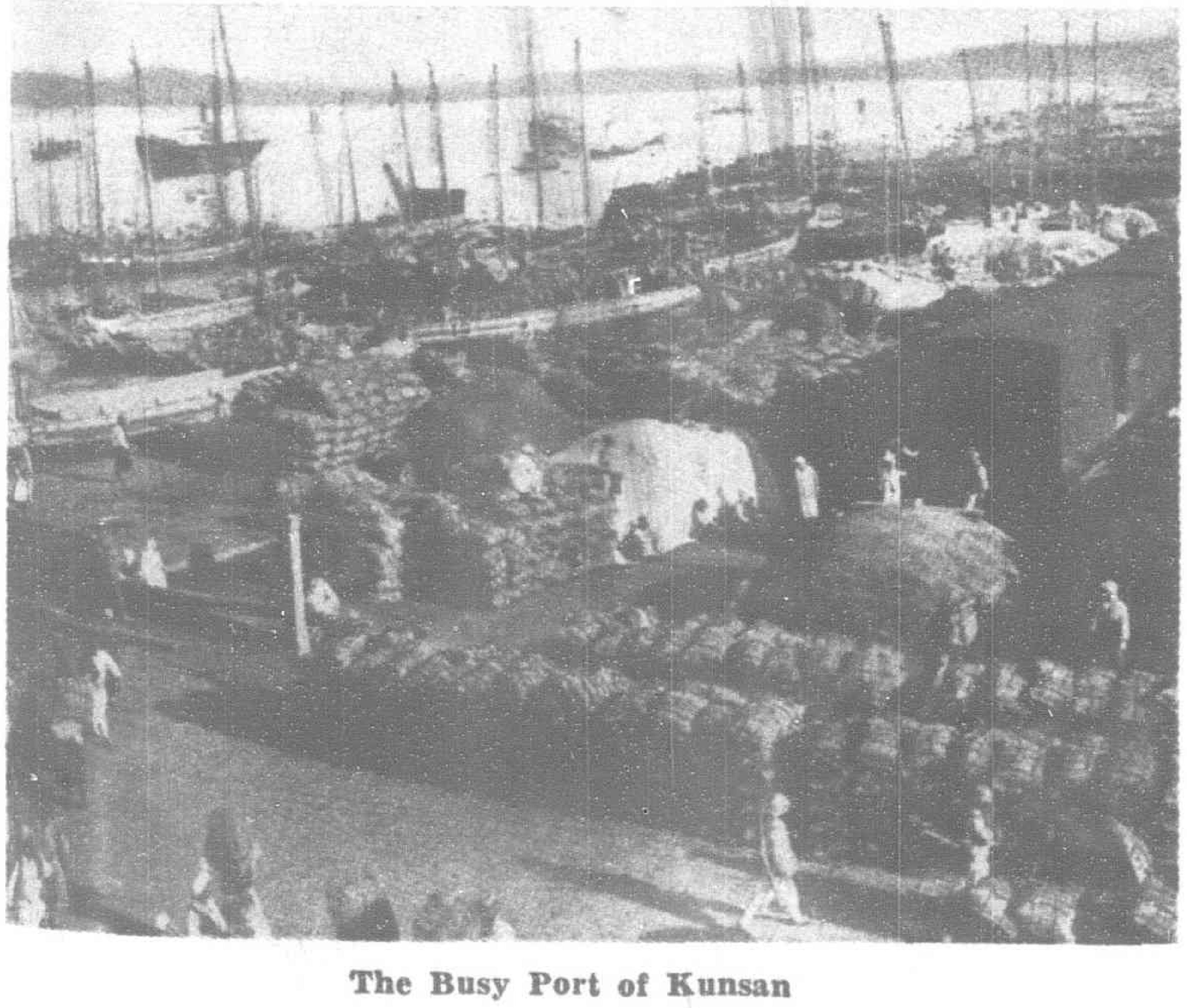
In the construction of roads the Government ruled that first class roads were to be 24 feet or more in width, second class 18, and third class 12. Execution of the first program took seven years and was completed in 1917 at a cost of Y.10,000,000. It comprised 34 highways measuring 1,700 miles, and the building of an iron bridge over the Kan-ko. For the second program the construction of 26 highways, some 1,200 miles in length, was projected at an estimate of Y.7,500,000 spread over six years, from 1917 to 1922. Owing to the rise in price of material and labor, the original estimates were doubled, and further augmented by the inclusion of an additional sum of Y.12,000,000 for frontier roads and bridges, the period of construction being extended by another six years. In 1926 enlargement of the scheme with an additional appropriation of Y.5,600,000 was made and the period for completion was extended to 1935.

By a further change of plan this additional appropriation has been increased to Y.31,119,000 and at present work is being carried on under this new plan to finish 2,308 kilometers of good roads by 1938.

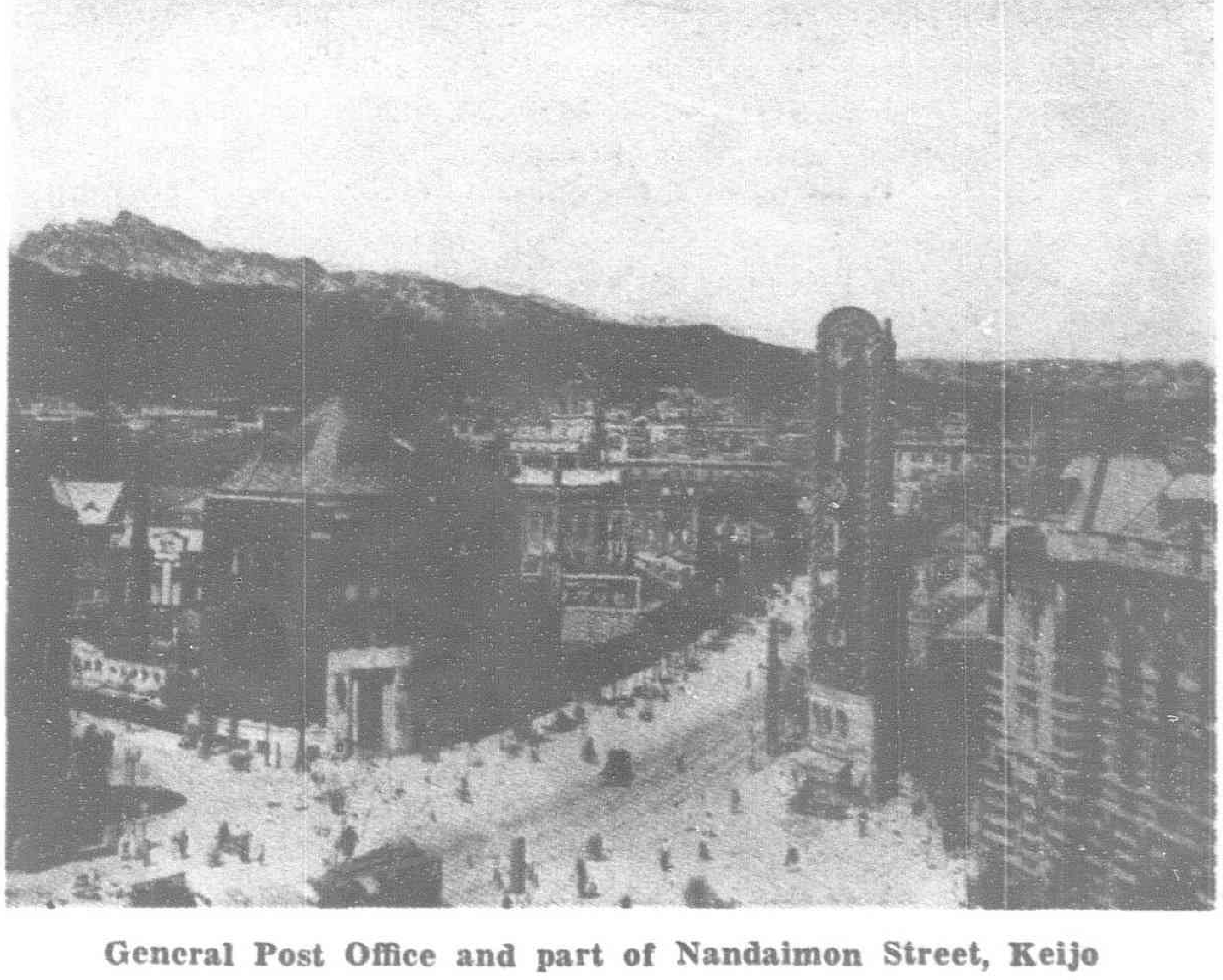
To facilitate the exploitation of the natural resources in the upper basins of the Yalu and Tumen rivers, another important work was started in 1932 to be completed in fifteen years. The total appropriation of Y.8,380,000 will provide 538 kilos of second class roads and 239 kilos of third class roads.

The road improvement in 1932 was as follows:

1st class road	21 kilometers
2nd ,, ,,	429 ,,
3rd ,, ,,	402 ,,
Total	852 kilometers



The Busy Port of Kunsan



General Post Office and part of Nandaimon Street, Keijo

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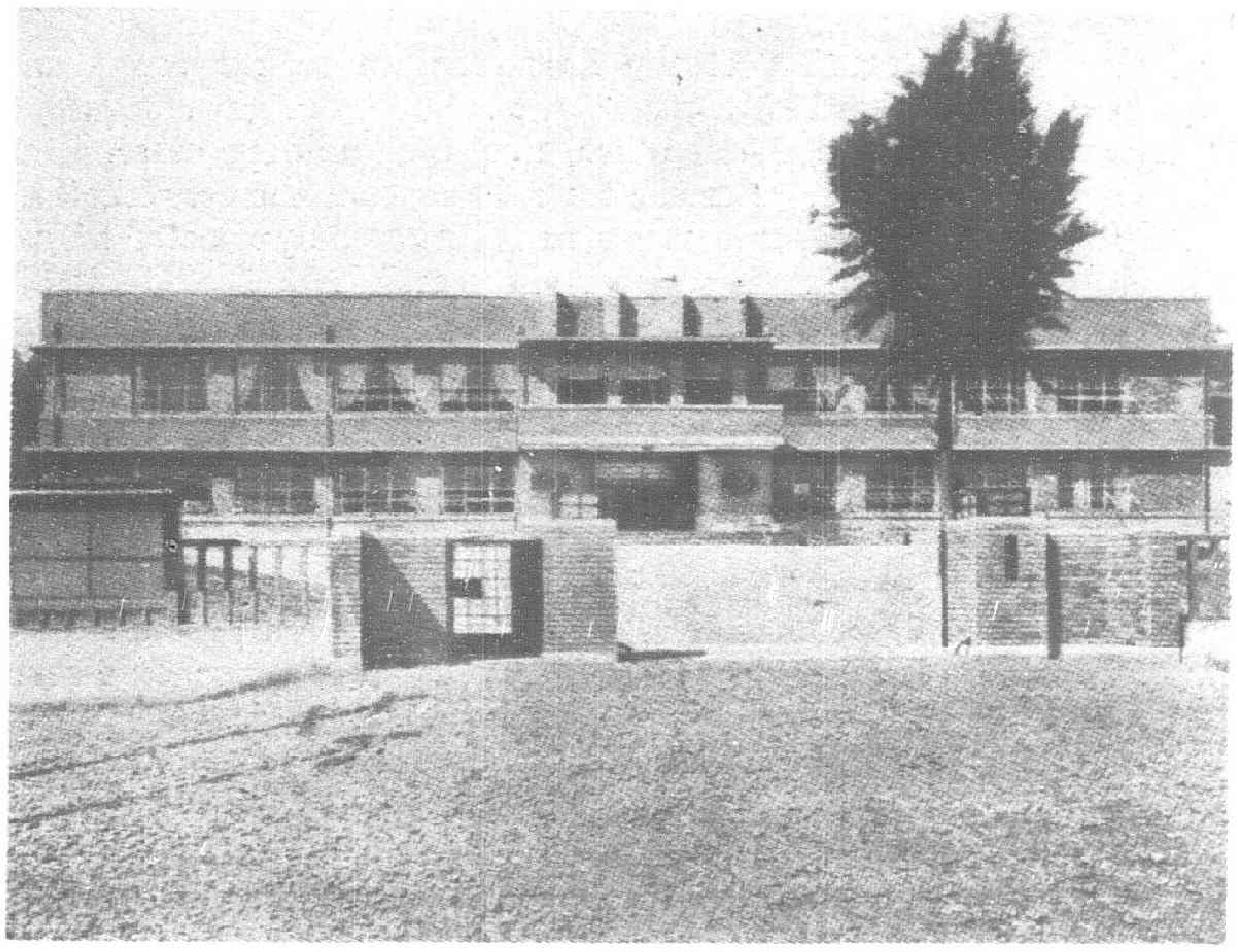
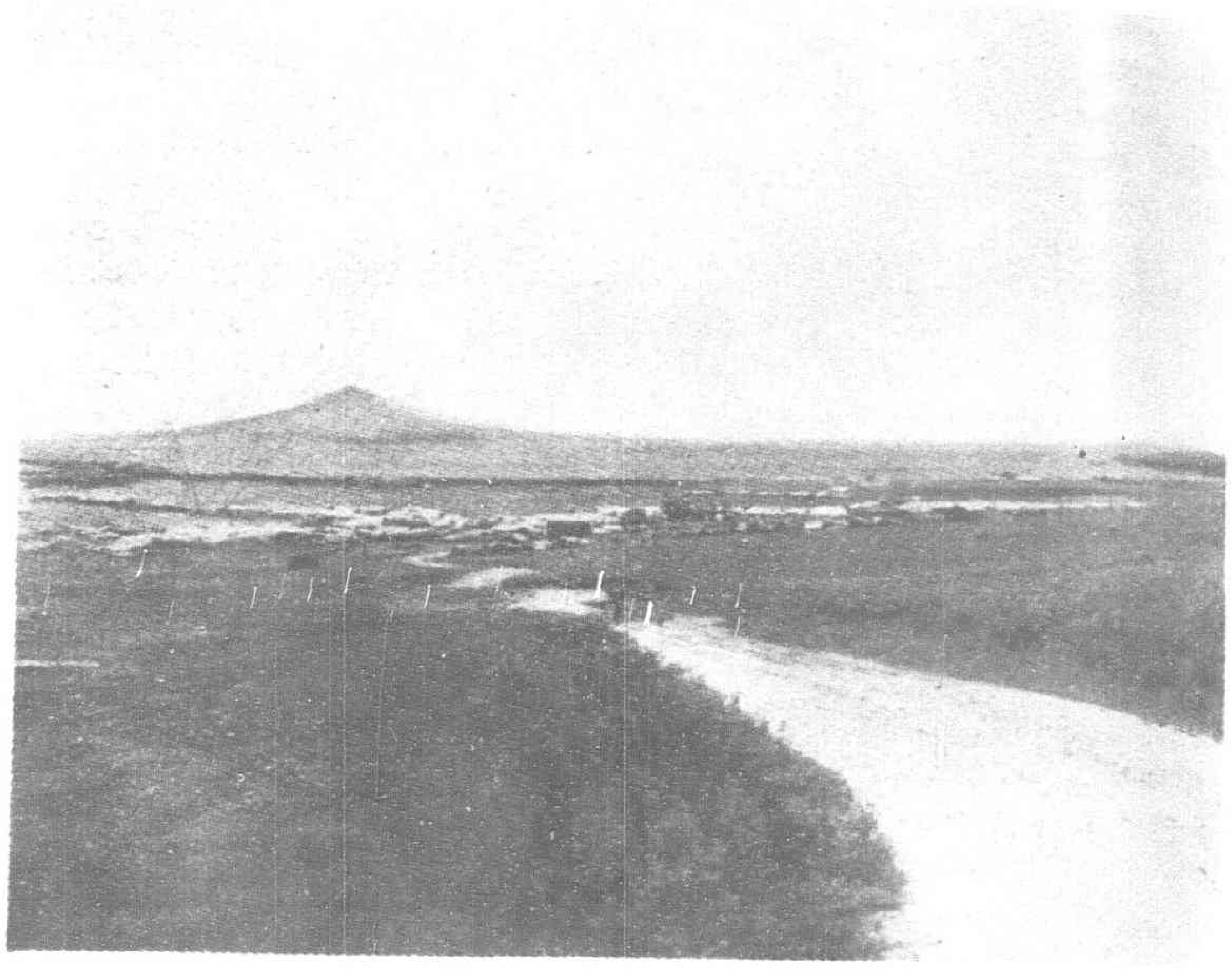
*Annual Report, Administration of Chosen, 1932-33

During the year under review the Government-General paid about Y.1,854,000 for the work under its direct control and also gave a subsidy of Y.4,697,000 to the provincial governments to carry on road construction works as a measure of poor relief.

One thing of special note is that in the summer of 1929 severe hailstorms visited several districts in North Heian and North Kankyo Provinces. The damage done to the crops was so heavy that the rural population were in danger of starvation.



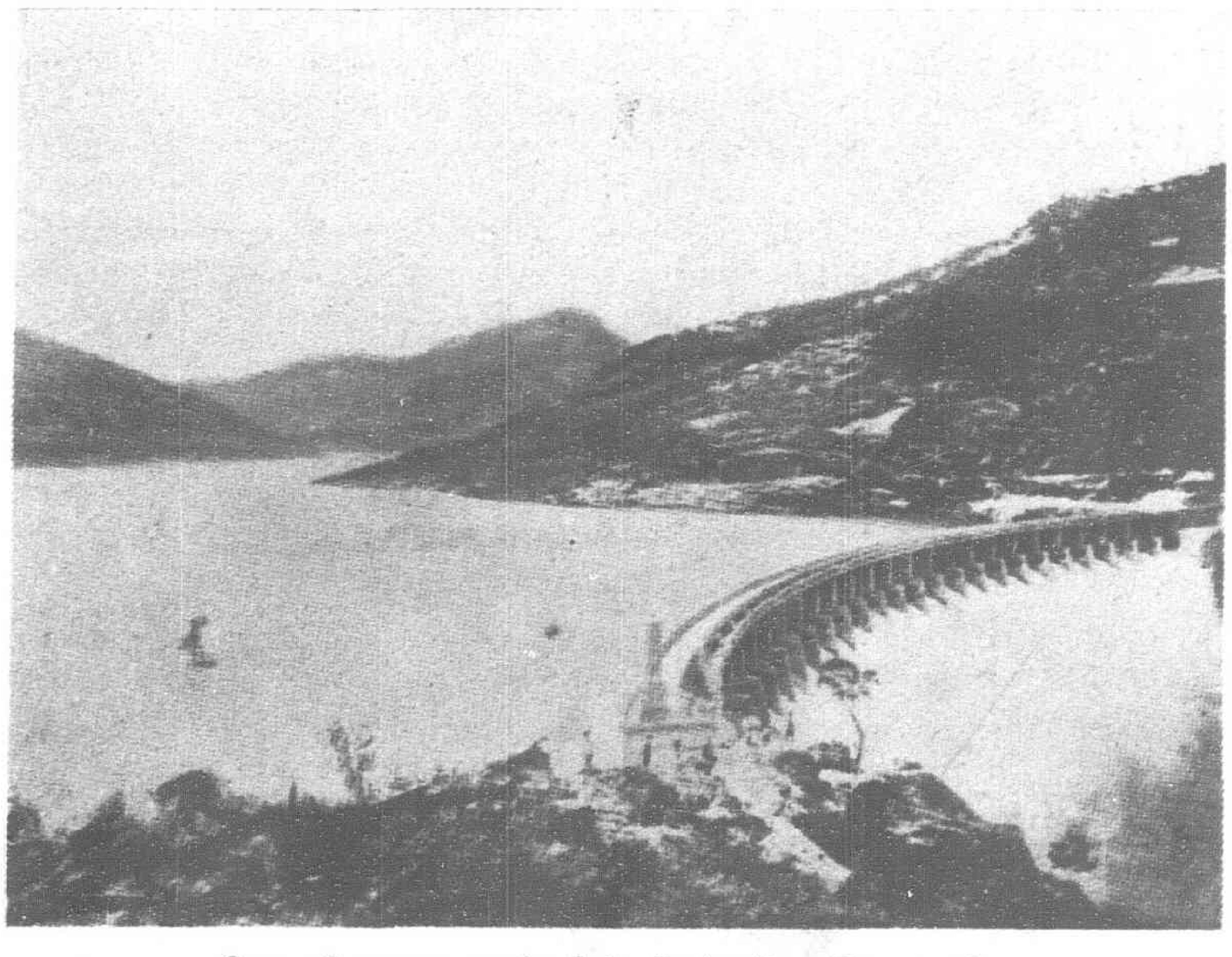
Municipal Offices, Jinsen



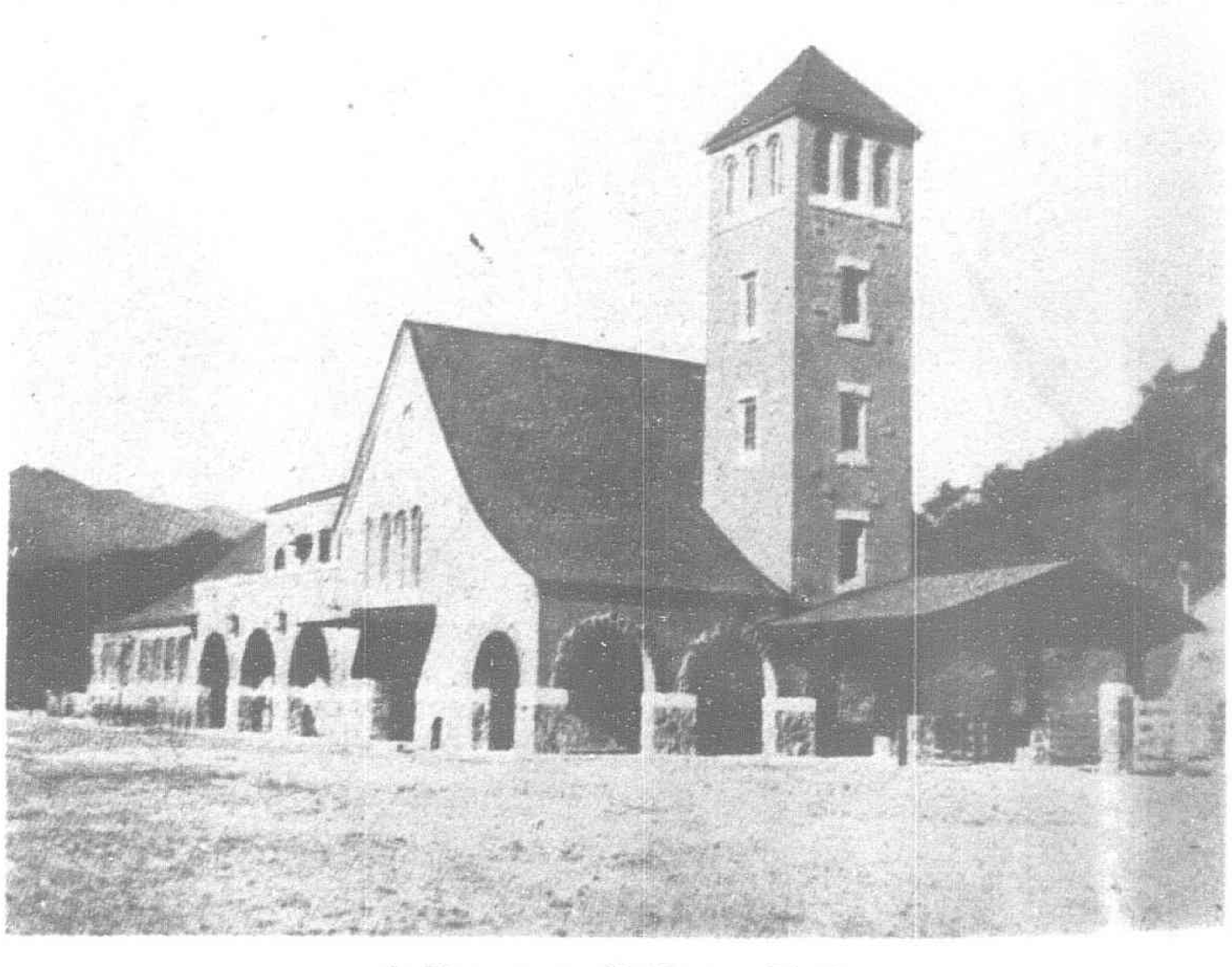
The new Port of Rashin in its infant stage

Tokuju Granite Palace in Keijo recently opened for Exhibition of Work of Modern Artists

Prince Ito's Memorial, Keijo



One of many up-to-date Irrigation Reservoirs



A Kongosan Railway Station

Therefore the provincial governments gave them direct aid with food and seed for planting. Moreover they carried on road construction works from 1929 to 1930 as a means of relief. At the same time the Government-General gave a subsidy of Y.55,000 toward this work.

According to the latest returns the length of roads already constructed is 11,062 km. of first and second class roads and 9,707 km. of third class roads, or 83 and 74 per cent of the length determined for the projected network. With the steady improvement of the highway system automobile services in the country have rapidly increased and nearly every local center is now connected with one or other of the principal towns.

Street Improvements

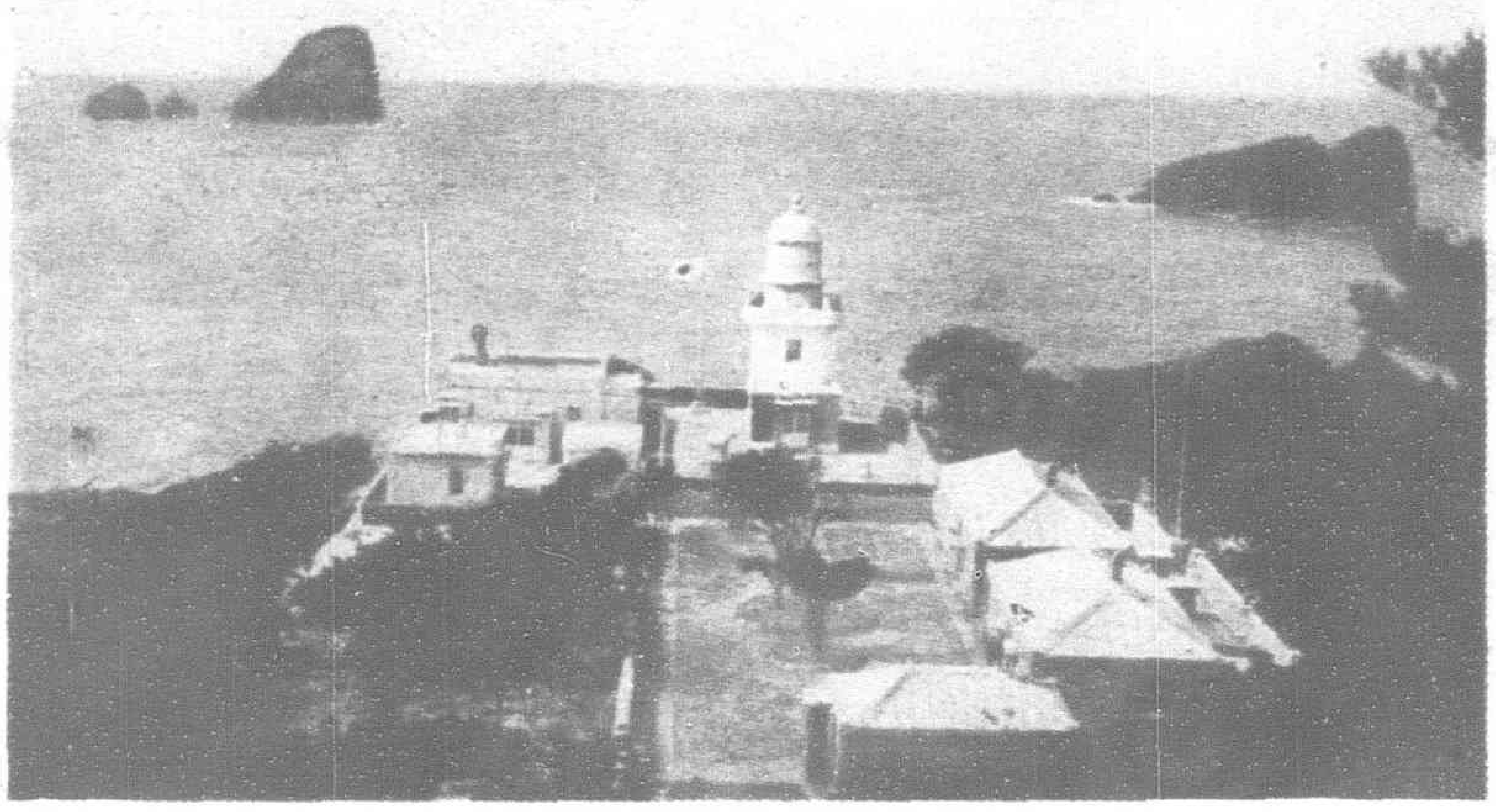
In view of the growing need for traffic facilities in urban areas street improvement or reconstruction has been extensively undertaken under the present régime, beginning with Keijo, where it was conducted at national expense to set an example to other towns, and the 13 streets selected for improvement were reconstructed at a cost of Y.3,000,000 from 1911 to 1918. The most important of these were made 12 to 19 ken in width and provided with pavements, and where traffic is heaviest the road surface is tar-macadamized or asphalted, thus adding to the modern aspect of the city. The second program, spread over six years from 1919, took in 12 streets, of which nine were completed by 1929 at a cost of Y.2,910,000.

During the year under review the streets in Kejio were much improved. The new road between the main-gate of the East Palace to the Keijo University Hospital—685.5 meters long is now completed thus adding one more step in the beautifying of the city and the convenience of traffic. The expense for this work is Y.425,000.

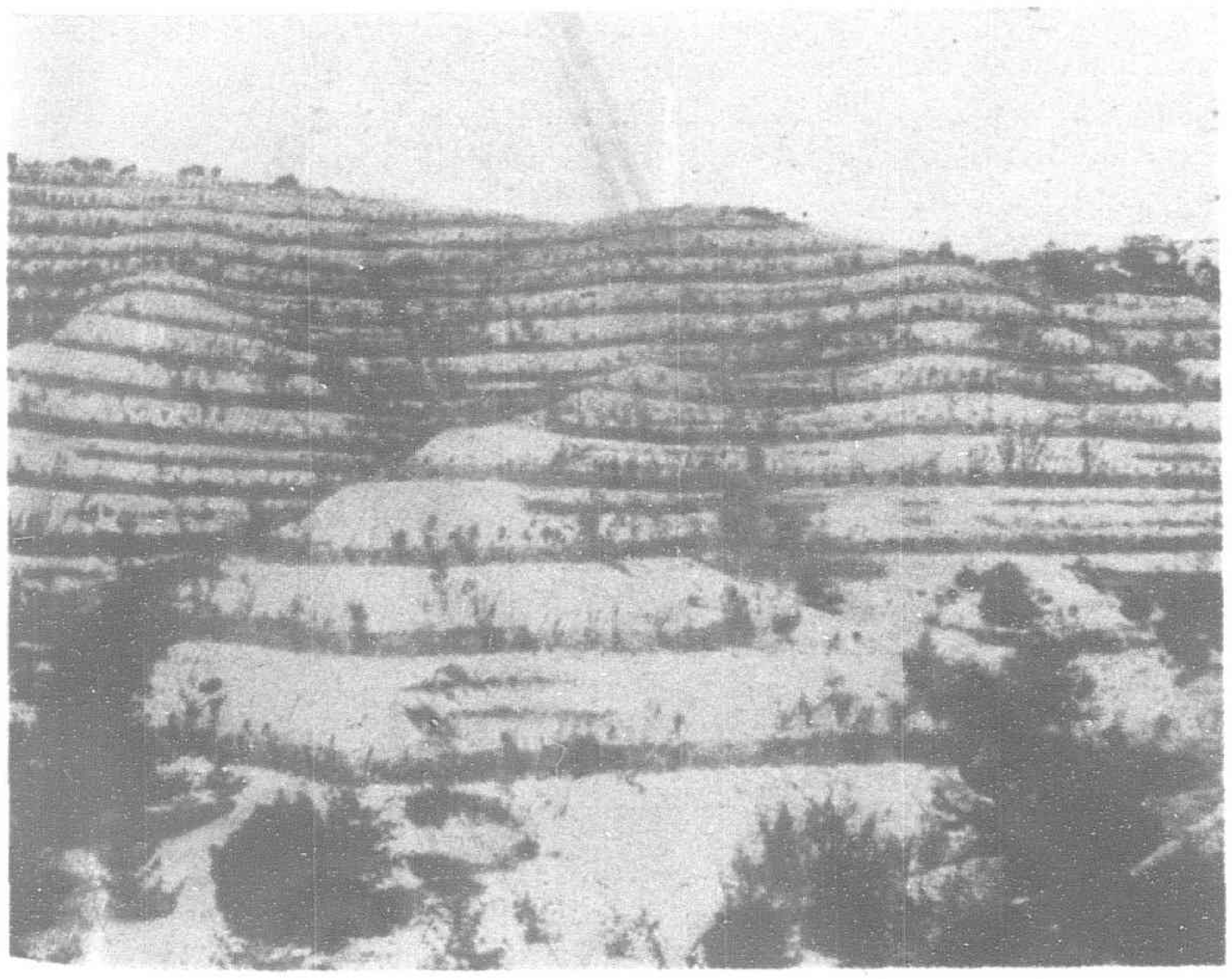
At present the road around Shoro (Bell Street) in Keijo is newly paved and the street leading to East Gate is being reconstructed at an expense of Y.615,000. The total length of that street is 1,203.5 meters, and the reconstruction work is now near completion.

Heijo, Taikyu, Fusan, Mokpo, Chinnampo, Gensan, Kanko and Yuki also made remarkable progress in their street road improvements.

An Arbor Day, April 3, when citizens of all ages, including the Governor-General throng the Bare Mountains to clothe them with trees


A Lighthouse on the East Coast

To forward the sound development of Korean towns, the Government has incorporated in the budget since 1921 a special item for investigation regarding town-planning, and started work on it in Keijo, Heijo, Taikyu, and Fusan. There are now 13 towns marked out for such work, including the chief seaports and provincial centers. The expenditure on these is defrayed out of the local revenues with some assistance from the Treasury, and work in each is well under way.


Sandy Hill Terraced and Planted

A complete sewerage system, as an aid to street sanitation, is still lacking in most places, so efforts are being made for its establishment side by side with street improvement in the large towns, which are first to feel such necessity. On such work nine towns have already gone to considerable expense, the largest among them being Keijo, Heijo and Kunsan. Part of the cost of construction is provided by the national treasury and part by public bodies.

Harbor Improvements

Harbor improvement was first undertaken in 11 important ports during the protectorate. While work was still going on, annexation took place, in consequence of which all these works were taken over by the present Government and vigorously pursued on a far bigger scale.

Fusan was the first port selected for development up to a maximum capacity of 700,000 tons a year, and this was completed in 1918 at the cost of Y.3,800,000. Direct connection was then made between the trunk railway line and the Shimonoseki-Fusan ferry service. However, trade through the port showing every sign of great increase, enlargement of the jetties, construction of a breakwater, and dredging of the harbor to provide a more spacious anchorage were started at the estimated cost of Y.9,000,000 to be completed in 1928.

The work at Jinsen was undertaken to provide the port with a lockgate dock, to accommodate with ease three boats of the 4,000 ton class along one side of it. A dock of this kind was sorely needed because of the great tidal range reaching 30 feet. Construction of it was started in 1911 at the estimated cost of some Y.7,000,000 and completed in 1923. Extension work is now in progress at the cost of Y.1,400,000, and will be completed in 1935.

The work at Chinnampo was begun as a four-year undertaking in 1911, and finished as planned in 1914 at a cost of over Y.830,000.

But the maximum difference of 24 feet between ebb and flow being still a source of trouble in unloading, this difficulty is still claiming the attention of the authorities.

The extension work of this harbor is now under construction on the side opposite the old quay-wall. It will be completed at the cost of Y.2,700,000 in 1935.

The harbor work at Kunsan was started at the estimated cost of Y.2,850,000 in 1926 and completed in 1933. Floating pontoons as quays were adopted to moor 3,000 ton steamships in order to avoid the difficulties due to the tidal range of 21 feet.

The work at Moppo Harbor was accomplished at the cost of Y.600,000 in 1933. Three pontoons were provided as a quay for 2,000 ton steamships for the same reason as at Kunsan Harbor.

The Yuki Harbor has a large basin, sloped wharf and one shed as the Custom accommodation, completed at the cost of Y.1,000,000 in 1932.

The harbor works at Seishin are destined to play an important part in the development of North Chosen. They were started at the estimated cost of Y.6,400,000 in 1922. Now under construction, there are a great breakwater of 600 m. in length, five berths of quay-wall, and other custom accommodation to be finished in 1935.

The works at Gensan were started as a seven year enterprise from 1915 at an estimate of Y.2,640,000 and finished in 1922, but the need for extension of the land equipments called for the expenditure of an additional Y.850,000 and the work saw completion in 1927.

At present a new harbor construction at the "Tasarugi" Anchorage (an island lying at the mouth of River Yalu) has been completed at a cost of Y.500,000 to the national exchequer. The harbor is joined by an embankment of 600 meters to the mainland by which connection is made with Ryugampo (Yongampo) and Shingishu.

River Improvements

The large rivers in Chosen, such as the Daido-ko, Kan-ko, Kin-ko, Rakuto-ko, etc., are of great value to traffic though they have not yet been utilized to their fullest extent. On the other hand, their inundation, an almost yearly event, results in more or less damage being done to the lands traversed by them, mainly because little has ever been done to keep them within proper bounds, and also because the precious forests at one time bordering them have been cut down regardless of resultant evils. Under the present régime, serious attention is being paid to river conservation, and survey of eleven large rivers has been completed resulting in an eleven-year program, taking in six of them at an estimate of Y.48,000,000, which was started in 1925.

RIVER IMPROVEMENT WORKS, APRIL, 1932—MARCH, 1933

(In thousands)

	Kan	*Bankei*	*Rakuto*	*Sainei*	*Daido*	*Ryuko*
	(Cub.m.)	*(Cub.m.)*	*(Cub.m.)*	*(Cub.m.)*	*(Cub.m.)*	*(Cub.m.)*
Excavation	398	432	7,304	183	—	214
	(Cub.m.)	*(Cub.m.)*	*(Cub.m.)*	*(Cub.m.)*	*(Cub.m.)*	*(Cub.m.)*
Embankment.. ..	397	432	5,382	114	—	214
	(Yen)	*(Yen)*	*(Yen)*	*(Yen)*	*(Yen)*	*(Yen)*
Shore protection ..	8	13	195	2	—	5
	(Yen)	*(Yen)*	*(Yen)*	*(Yen)*	*(Yen)*	*(Yen)*
Water-gate	17	96	202	12	3	3

Waterworks

Owing to the nature of the soil Korean water is generally very hard, and even the well-water is found in many cases not good enough for drinking purposes. Moreover, it not seldom happens that the natural supply of water runs short, especially in the large towns thus menacing the health of the people. To meet this danger the authorities are encouraging the construction of modern waterworks wherever possible.

The only cities possessed of waterworks in pre-annexation days were Keijo, Heijo, Fusan, and Mokpo, but now no town of importance lacks such provision, and the number of towns so provided has risen to 33. In the establishment and operation of them both Government and local public bodies took part, but in March, 1922, the Government transferred the waterworks run by it to their respective towns, though in the case of new construction financial help is still given by it in proportion to the need, ranging from 30 to 50 per cent of the actual cost.

Public Buildings

At first most of the public offices in the country were housed in the old native buildings, so the Government annually spent two to three million yen in constructing new buildings, but after the year 1920 the budget estimates for buildings were more than doubled owing to expansion in the various public undertakings, including the erection of new Government-General Offices, the Chosen Jingu, Keijo University, etc.

The new edifice for the Government-General is situated in the grounds of Keifuku or North Palace, Keijo, and is a five-storey one of ferro-concrete in modern Renaissance style, covering a floor area of 1,115 tsubo. The work was started in 1916 as a ten-year enterprise at an estimate of three million yen, but the subsequent rise in the price of material and wages more than doubled the cost as originally estimated. In January, 1926, the Government entered its new home.

The Chosen Jingu as the center for national ceremonies, stands on Nansan or South Hill, Keijo, commanding a fine view of the country around. The work was begun with a ceremonial purification of the site in May, 1920, at an estimated expenditure of Y.1,500,000 and was completed as arranged in October, 1925.

The establishment of Keijo Imperial University as the copingstone of all educational institutions in the country has been in steady progress since 1924 as a four-year enterprise at an estimated cost of Y.1,668,000. It is situated in the north-east of the city and the buildings include library, main hall, and class-rooms for the several departments.

The new building for law courts in Keijo including the Local Court, Court of Appeal, and Supreme Court, was started in 1926 as a three-year enterprise at an estimate of Y.600,000, and the work is already completed.

Japan's Oil Resources

British and American Oil companies are closely watching recent developments in Japan's official policy of encouraging home industries, according to a Reuter message from Tokyo.

At a conference held recently by representatives of the War, Navy, Overseas, Commerce and Finance Ministries, it was decided, according to Japanese Press reports, to appoint a commission to study a national oil policy for Japan.

This commission, it was stated, would consist of three subcommittees, which would be assigned, respectively, to consider the questions of :—

Exploitation of oil resources at home and abroad ; furtherance of development of oil substitutes ; and development of the oil industry itself.

Twenty years ago Japan was virtually self-supporting in the matter of petroleum products. In recent years her consumption of petroleum in its various forms has increased by leaps and bounds, while her domestic production has remained practically stationary at about 275,000 tons annually. To make up the deficiency, she had to import no fewer than 2,010,000 tons last year, as against an importation of only 246,000 tons in 1924.

In other words, during the ten-year period of 1922-32 her dependence on the importation of petroleum products from abroad increased from less than half her total requirements to more than seven-eighths. Japanese authorities realize fully the important bearing which an adequate oil supply has on national defence.

Even before 1923 the importance of assured supplies of oil had been receiving considerable attention, and, in so far as the Japanese navy was concerned, the policy advocated by Lord Fisher for Great Britain had already been adopted. This was the policy of purchasing large supplies of fuel oil whenever prices were low and storing them up for times of emergency.

It remained for the disastrous earthquake of 1923 to demonstrate with startling clarity the absolute dependence of Japan on outside sources for her requirements of benzine and other refined products of petroleum for motor transport and aviation purposes. The stocks available were quickly exhausted and totally inadequate to cope with the demands until fresh supplies could be rushed into the country from abroad.

The authorities took the lesson to heart, and during the ten years that have since elapsed a number of large and up-to-date oil refineries have been established. Oil refining in Japan, in a message from Tokyo, has rapidly developed into an important industry.—*Financial Times.*

Diesel Engines for Ceylon

A Proposal that is recommended as "the most economical means of re-establishing stability in the Railway in the future," will shortly come up for consideration by the State Council of Ceylon.

This is the introduction in the Railway of three Broad Gauge light-weight passenger trains with incorporated Diesel Electric power units, consisting of four vehicles per unit for suburban and inter-suburban passenger service.

Provision has been included in the Budget estimates for the next financial year, and the matter is being brought up in the Councii now to obtain authority for the preparation of indents with the object of calling for tenders to obtain delivery of the train units as early as possible in the next financial year.

In the course of his report on this subject the Minister of Communications and Works states :—

The estimated cost of the three proposed units landed in Ceylon and ready for service complete with adequate spares to ensure continuous service is Rs. 800,000 and the sum included in the draft estimates is Rs. 836,400 to allow for any contingencies and to avoid any possibility of having to apply for supplementary funds.

From the statistical details in regard to working and maintenance costs of the proposed light train units, it will be noted that a sum of at least Rs. 214,365 per annum could be saved with the introduction of only three of these train units for the Colombo—Galle—Matara services.

The estimated life of these units is at least 20 years for the direct electric equipment (it is understood that other Railway Administrations have accepted a life of 25 years) and 15 years for the carriage bodies and assuming a depreciation charge of 6 per cent on Rs. 800,000 or Rs. 48,000 per annum and deducting this amount from saving of Rs. 214,365 will still leave a nett saving of Rs. 166,365 per annum as compared with present steam traction.

The cost of providing a steam locomotive and existing type carriage stock of equivalent seating accommodation to one of the proposed light train units would be Rs. 176,000 as compared with Rs. 266,666 for a light train unit. Allowing for the shorter service life of the light train unit the first cost of the light train unit can be taken at approximately double that of an equivalent steam train but the working and maintenance costs of the light train unit will at the most be only one-third the cost of steam traction.

Taking the most optimistic view there is very little hope of the Railway earnings amounting to more than between Rs. 24,-000,000 and Rs. 25,000,000 per annum, and it will be at least three years before this revenue will be forthcoming. It is, therefore, necessary to consider the immediate future from this standpoint.

In so far as ordinary working expenditure is concerned, it is and will continue to be impossible to budget for less than approximately R. 19,200,000 per annum with market commodities at present price, and if there is any rise in cost of stores and materials this figure will have to be correspondingly increased ; but on the assumption that the actual working expenditure is maintained in the region of Rs. 19,000,000 per annum, it will not with present methods and means of operation be possible to meet the annual interest charges which may be taken at Rs. 6,250,000 much less provide funds to make good the arrears in renewals and to meet wasting assets in the future ; and it is only by the introduction of modern and more economical means of transportation that ordinary working cost can be reduced.

It is considered possible to operate all passenger train service between Matara and Colombo, Colombo and Puttalam, Maradana and Polgahawela, Pallai and Kankesanturai, covering approximately 1,630,000 train miles per annum with 18 of these light train units.

The cost of operating and the maintenance of steam locomotives for these services will at least be Rs. 2,005,000 per annum whereas the light train units would perform the same service at a cost of Rs. 637,330 thus saving Rs. 1,367,670 per annum. If therefore 18 of these units could be placed in service before the end of 1935-36 the sum in excess of expenditure at the end of 1936-37 would be increased from Rs. 5,500,000 to Rs. 6,867,670. The Railway would not only be in a position to meet the full interest charges but there would be a sum of Rs. 617,670 available for the Renewal Fund.

Another report deals with the offer by Messrs. Armstrong Whitworth and Co., to the General Manager of the Railway of the loan for six months of two Diesel Electric Locomotives for the purpose of demonstration.

As previously stated in these columns the Executive Committee resolved that the offer be accepted.

In his report the Minister states :

These two locomotives are practically complete and ready for shipment and the firm are prepared to deliver them to the Ceylon Government Railway together with skilled maintenance staff for the purpose of demonstrating the advantage of this form of traction compared with that of ordinary steam locomotives. The engines will be used on local services for a period of six months, running approximately 100,000 miles during that period and will be maintained and run by the Company, the Railway Department supplying the drivers and paying the firm 75 per cent of the cost of steam traction for the same mileage.

Should the demonstration prove satisfactory the Railway Department has the option of purchasing the two locomotives at the expiry of the trial period at a cost of £30,880 for the two engines and £2,000 for spare parts which price includes freight and insurance to be adjusted to actual cost. Should the trials prove unsatisfactory or for any other reason it is not desired to purchase them, the Railway is under no obligation to do so and the locomotives will be removed by the firm at their expense.

The cost of running the locomotives can be met from Abstract C of the Railway Estimates without having to approach Council for extra money and the anticipated savings on the experiment are estimated at Rs. 30,750 during the six months.

A tentative agreement has been drawn up between the representative of the firm and the General Manager of the Railway, containing full details of the terms of the arrangement and a copy of this has been laid on the table for information of members.

Apart from the lower cost of running these locomotives and the consequent saving during the trial period, this offer gives the Railway Department an opportunity of testing, under local conditions, the advantages of Diesel electric traction, which is considered the most modern method of operating railways, and also affords a unique opportunity of training both running and maintenance staff under expert supervision without cost to the Railway, in preparation for the time when Diesel traction becomes widespread.

It is necessary that a decision be arrived at as early as possible as the firm cannot allow it to remain open indefinitely, and it is strongly urged that this Council gives the necessary sanction for the General Manager to proceed with the matter at once.—*Ceylon Observer.*

Singapore Harbor Work

Additional deep water wharfage totalling 3,300 feet will be provided by the new scheme to extend the accommodation for large vessels at the Singapore Harbor Board.

Mr. G. W. A. Trimmer, Chairman of the Singapore and Penang Harbor Boards completed the preliminary arrangements for the extension in consultation with the firm of Coode, Wilson, Mitchel and Vaughan-Lee and as soon as the specifications are completed and accepted the work of extension will be proceeded with.

The scheme, for which Government is to grant a loan, involves the joining up with a concrete wall between Jardine's Wharf and the old P. & O. wharf, and it will be necessary in the course of the work to reclaim Blangah Bay and the lagoons around the P. & O. wharf.

The plan also entails the removal of part of the Meander Shoal opposite Section 10 and the channel will be dredged. The depth of water alongside the new wharves will be 33 feet.

Owing to the fact that the arrangements are not fully completed fuller information is not available at the moment. The scheme, it is understood, is an extensive one and will take some considerable time to complete.

The engineers for the extensions will be the consulting engineers in conjunction with Mr. G. W. A. Trimmer.

New Chinese Customs Preventive Vessels

Wenhsing and *Yunhsing* are placed in Service on the Yangtze River

The two Chinese Customs Preventive vessels of " B " Class, *Wenhsing* and *Yunhsing* which have been built by the Kiangnan Dock & Engineering Works, Shanghai, China, have already gone into service on the Yangtze River.

The design of the vessels was carried out by Captain L. R. Carrel, Coast Inspector, with the assistance of his staff.

The principal dimensions of the vessels:

Length over-all	143-ft. 0-in.
Length B.P.	135-ft. 0-in.
Breadth Mld	23-ft. 0-in.
Depth Mld.	13-ft. 0-in.
Draft loaded	6-ft. 6-in.
Displacement loaded	340 tons
Speed	15 knots
B.H.P.	1,400

The vessels are built to scantlings equal to Lloyds and are constructed to special survey of the Customs surveyors.

They are built with a raked stem and cruiser stern, with raised forecastle and two masts, the general arrangement presenting a smart and workmanlike appearance. All deckhouses are of 6 m/m bullet proof steel and protection around the guns provide for the handling and safety of the crew under working condition.

The deck machinery is all electric and consists of a powerful naval type windlass with double capstans overhead, electric steering and hand gear, electric capstan for lowering and lifting motor-boats. The motor-boats are fitted with Morris " Navigator " engines and are protected with bullet proof plating 5 m/m thick. These boats are fitted under special patent davits. Wireless apparatus is fitted with a range of 250 miles.

A cold storage chamber is fitted on deck with a " York Shipley " refrigerating unit.

The armament consists of a 3-pdr. Hotchkiss gun, three machine-guns. Lewis gun mountings are arranged throughout the vessels.

On the trials which were carried out on the measured mile in the South Channel outside Woosung, a speed of 15.029 was attained and the machinery installation proved entirely satisfactory.

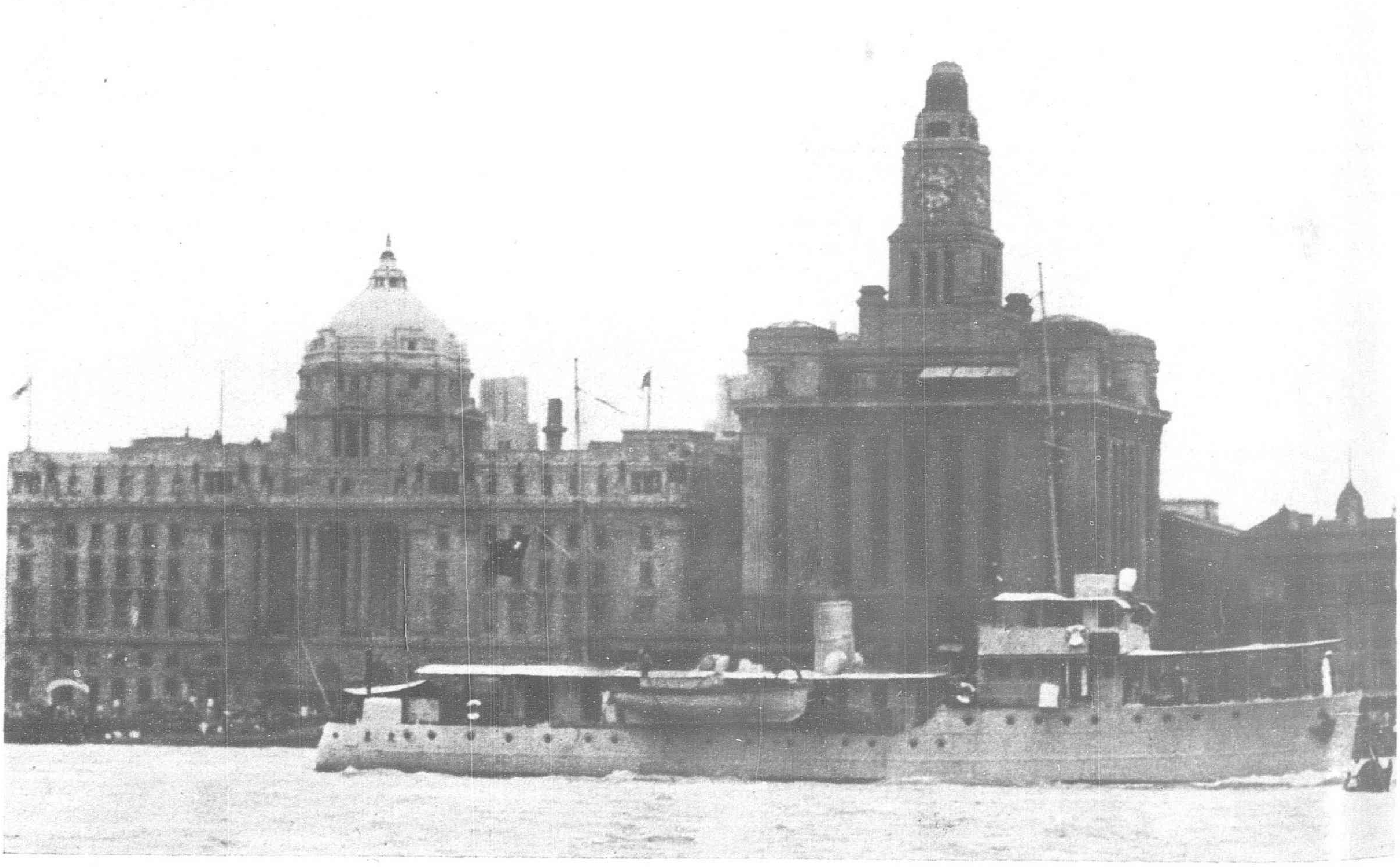
Machinery

The anchors and cables are all 30 per cent in excess of Lloyd's requirements. This has been done due to the dangerous anchorage these vessels will often have to lie in, also for the numerous times they will have to move daily. Twin capstans are fitted on the forecastle driven through gearing by an electric motor installed in the' tween decks, ample power is given and the motor is controlled from the forecastle. These capstans can also be operated by hand. The makers are Atlas Works of Bremen with A.E.G. electric equipment. An electric capstan is fitted aft with ample power for lifting the motor-boats, necessary leads are fitted for mooring the vessel.

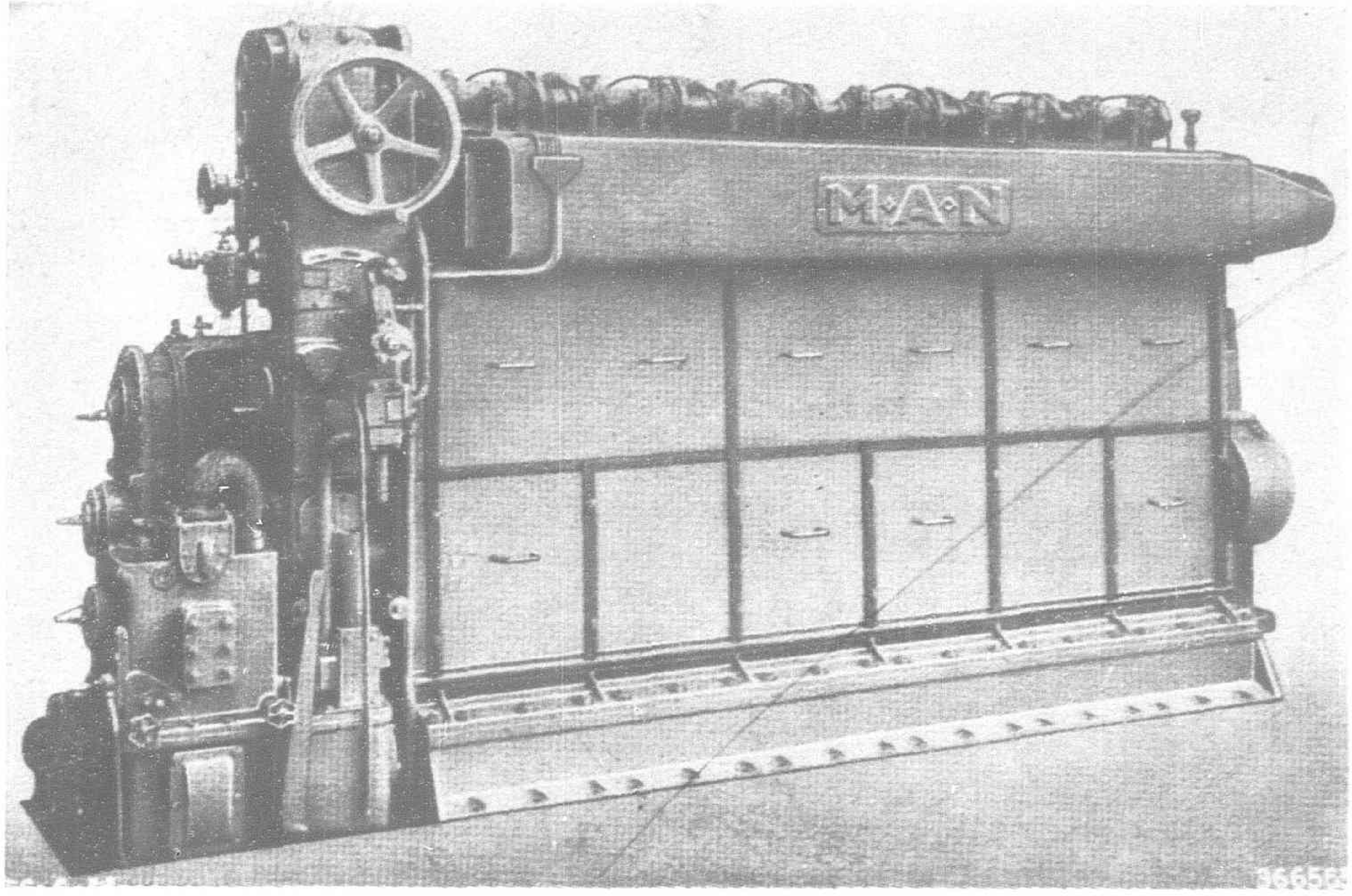
The capstan is made by Messrs. Thos. B. Thrige of Denmark. The steering gear is also electric and made by the Atlas Works of Bremen. This gear is fitted in the wheelhouse and has automatic cut outs for hard over each direction. A hand steering wheel is fitted to the machine as an emergency. The hand control for the motors is provided from two positions forward, one in wheelhouse and one on upper bridge.

Propelling and Auxiliary Machinery

In order to keep the deadweight of the vessel down to a minimum and owing to particular requirements, special lightweight engines have been chosen for this ship. The M.A.N., well-known



The "Wenhsing" pictured off the Shanghai Bund with the Hongkong & Shanghai Bank, left and the Customs House, right in the background



Showing the M.A.N. Light Weight High Speed Diesel Engine with which all the newly built Chinese Maritime Customs vessels are equipped. Each engine develops 700 b.h.p. at 700 r.p.m.

manufacturers of Diesel engines, were given the order for the power plant. The vessel is propelled by two M.A.N. 4-cycle trunk piston Diesel engines of special lightweight and high speed. They are started by compressed air without means of any preheating or igniting device immediately from cold, which fact is of great importance with this type of vessel, and are using airless injection. They are direct reversible and are the last word as far as this type of engine is concerned. The engines are of six cylinder type with the bore of 300 mm. with a stroke of 380 mm. Each engine developes 700 b.h.p. at 700 r.p.m. The engines were constructed at the Augsburg Works of the M.A.N.

The weight of each engine is only 8.5 tons, which weighti ncludes the built-on bilge-, circulating water-, fuel supply-, and lub-oil pumps as well as one built-on compressor for each engine. Naturally flywheel, thrust bearing, and all pipings on engine are included in this weight. The engines, as may be seen from the cut, are of the block type construction, which gives the engine a rigidity and stiffness not reached by signle cylinder construction. It is of special great importance in these light draught vessels. In addition to the single block construction, the engines have also the well-known M.A.N. tie-rods. These tie-rods, made of high grade steel, are inserted during the erection of the engine with an initial stress, thus relieving the casting of all unnecessary stresses resulting from compression and combustion pressures. These tie-rods reach from the top of the cylinders down to the cross members of the crank case. The employment of these tie-rods allows the provision of large openings in the crank case so that the running gear may be easily attended to, a fact of great importance specially with marine engines.

Cylinder liners of special close grain casting are inserted to each cylinder. These liners can expand freely downward.

As already mentioned, the following pumps are directly driven off the engine: fuel supply, circulating water, bilge and lub-oil pumps. For the lub-oil two pumps are provided: one to press the lub-oil through the engine, the second to suck the lub-oil out of the crank case and pump it through the lub recooler to the lub-oil service tank. Thus under any condition of trim of the boat the lub-oil is not allowed to accumulate in the crank case. The bilge and cooling water pumps are being all cross connected.

The fuel oil injection pumps are attached directly to each cylinder, thus giving an equal distribution of fuel oil in every cylinder and an equal distribution of power. Smooth running is thus ensured. Besides, all fuel lines are of equal lengths. Safety governors provide against racing of the engines.

The whole machinery is, as already mentioned, the latest of its type designed by the M.A.N. The engines are manufactured with the newest machine tools: needless to say that all parts are interchangeable, thus the upkeep is made easy, every part being easily accessible and can be attended to without any great trouble.

Auxiliary Machinery

For the generation of electric current there are two D.C. generators directly driven at 800 r.p.m. by Widdop vertical high speed Diesel engines. One engine is 60 b.h.p. the other 50 b.h.p.—each engine is fitted on the same bedplate with a generator and air compressor. The air compressor is of 40 c/m per min. capacity and fills the air tanks with compressed air up to 60 atmosphere. Five air tanks in all are fitted in the engine room.

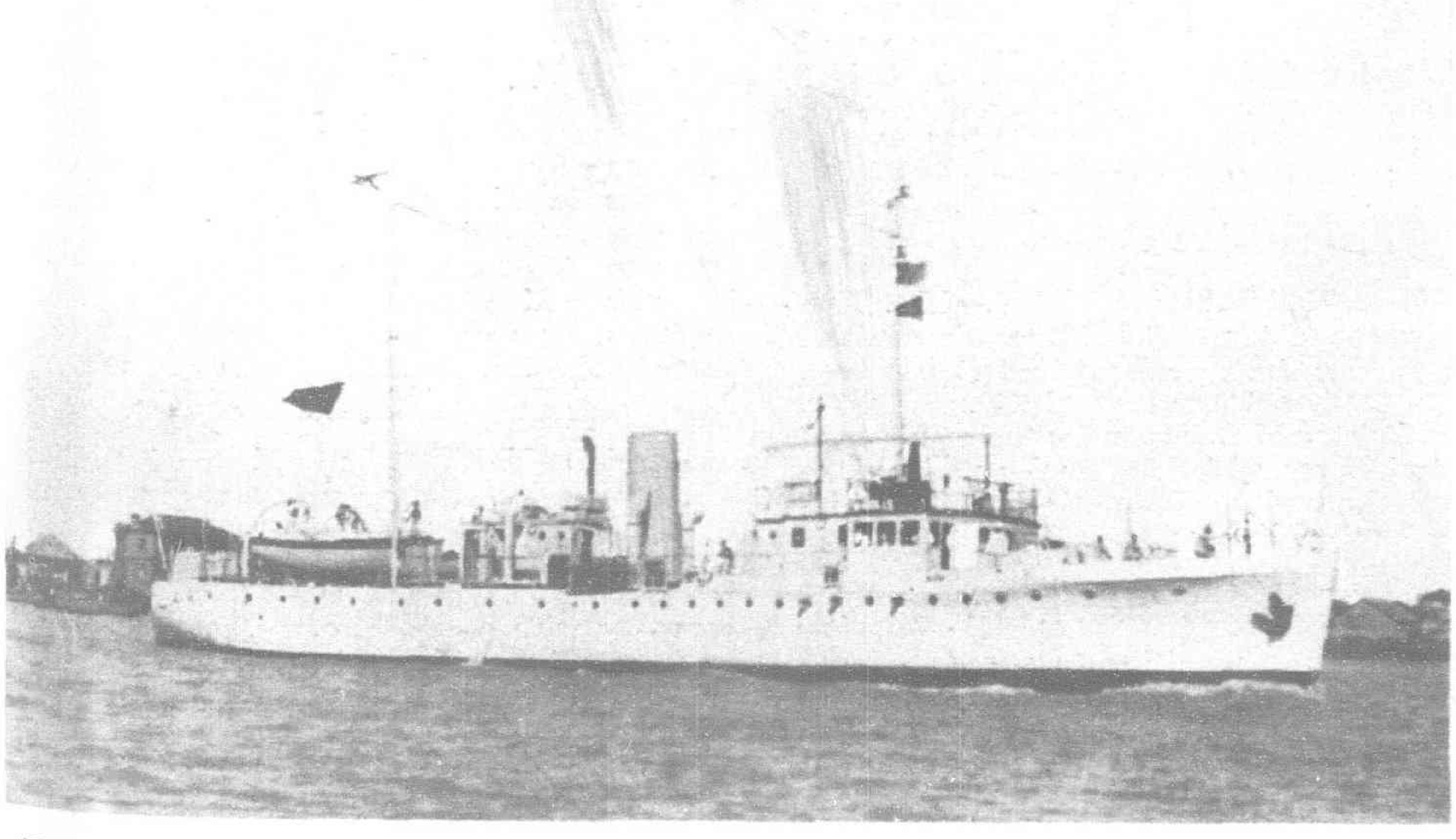
The generators supply all necessary current for lighting and heating the vessel throughout with electricity. Fans are fitted where required, two searchlights of 1,000 candle power each are fitted on top of the wheelhouse. All deck machinery is electrically driven and auxiliary pumps in the engine room, as well as the refrigerator.

The following pumps are fitted in the engine room:

Standby cooling water,
,, bilge,
,, general service,
Sanitary—fresh water,
Fuel transfer,
Lubricating oil pumps,

The engine room has all the latest and necessary filters, oil coolers, strainers, and lubricating and fuel oil separators installed. Hand pumps are fitted where necessary. Silencers of ample dimension to ensure quiet running of the engine are installed in the funnel. Michel Thrust Bearing are fitted and the shafting and propellers are all especially designed for this power at high number of revolution.

A very complete inventory of spare parts are supplied and in every manner the vessel is of the very latest design.



The "Sooshing," shown above and the "Chashing" are sister ships and are "C" Class vessels built for the Customs Preventive Service by the Kiangnan Dock & Engineering Works

Railway Development in Jehol

Reports from foreign observers indicate that the Japanese program for the development of Jehol involves the linking up of the provincial capital with the present Peipiao branch line, originally built as a branch line from the Peking-Mukden railway for the development of coal mines served by Newchwang as a shipping port. They also report that the Jehol authorities plan to develop this rail communication in a westerly direction, and that their most ambitious project is to link Jehol and Dolonor.—*Eastern Engineering and Commerce.*

Engineering Notes

INDUSTRIAL

MOTOR CAR FACTORY FOR DAIREN.—The founding of an automobile manufacturing company in Dairen with support of Japanese and Manchoukuo capitalists, is expected to be sanctioned by the Manchoukuo Government. The company will be capitalized at Y.6,210,000, of which Y.2,900,000 will be invested by the South Manchuria Railway Co.

MANCHURIAN ALUMINIUM FACTORY—Construction of an aluminium factory in Manchoukuo is under way by the Nichiman Aluminium Co. This concern is experimenting with refining and rough aluminium will be produced for shipment to its Toyama factory for refining. The first lot (amounting to 1,000 tons) is scheduled to be placed on the market in March next.

TOKYO'S NEW RESERVOIR.—The Yamaguchi Reservoir, largest in the Far East, has been formally opened. It covers about 408 acres and has a capacity of 640,000,000 cubic feet of water. To build it has cost Y.11,550,000. The reservoir, according to the "Jiji Shimpo," is to have a paved driveway for motorists. A pond of 10,000 *tsubo* will be constructed for duck hunting, and an open space of about 30,000 *tsubo* will be reserved for campers.

COMBED WOOL FILATURE.—A contract has been signed with a French firm for the complete equipment of a filature for combed wool, to be established at Taiyuanfu. The machinery will be ordered from France and a specialist will be sent out for its installation. The cost is estimated at Fr.2,000,000. The new filature will be the first of its kind in China. The equipment will be supplied by a firm in Mulhouse, which, in a way, introduced the combed wool industry to Japan.

FORD FACTORY FOR SHANGHAI.—Nanking denies recent press reports alleging conclusion of an agreement between the Ministry of Industry and American Ford interests for the opening of an automobile factory in China, but admits that negotiations are proceeding. Reports in the Chinese press stated that an agreement had been signed, the factory to be jointly financed by the Chinese Ministry of Industry and Ford interests. The Chinese Ministry would put up $2,000,000 while the Ford people would raise $4,000,000.

SUGAR INDUSTRY IN CHINA.—Negotiations have been proceeding between Nanking officials and overseas Chinese with a view to financing a large-scale sugar industry. A number of experts are investigating conditions in South China, and it is understood that their report will be submitted to the Government. China imports approximately $100,000,000 worth of crude and refined sugar every year, although she has large areas suited for the cultivation of cane and beet. The opinion has been expressed by Chinese industrialists that, if energetic steps are taken to develop the sugar industry in China, there will be little room left for imported products.

MOTOR CAR FACTORY FOR YOKOHAMA.—A new automobile manufacturing company has been established in Yokohama. It has a capital of Y.10,000,000. Japan Industry turns over to the new company the Osaka branch of the old Dat Motor Company as well as the right to make the small-type car, "Datsun." The value of this relinquishment is set at Y.1,000,000. The plant of the new company, the Motor Car Manufacturing Company, Ltd., covers 25,000 *tsubo* at Koyasu, Yokohama, of which 5,000 *tsubo* is set aside for buildings. According to plans, 5,000 "Datsun" cars are to be built annually. The company expects, at some future date to have an output of 20,000 small cars yearly.

NEW S.M.R. PROJECTS.—The South Manchuria Railway Co., to its already long list of modern industrial enterprises, announces two new projects, the manufacture of cement and of gasoline, both by the Shale Oil Plant at Fushun. The board of directors has authorized the establishment of a company with a capital of Y.3,000,000 to produce approximately 100,000 tons of cement annually. For the present fiscal year, it is estimated that 25,000 tons of shale gasoline will be produced. The gasoline enterprise is attracting considerable interest, inasmuch as this will be the first time in the world that gasoline is to be manufactured from shale oil. The refining process was invented by Mr. Raizo Ohashi, who is in charge of the Fushun Shale Oil Plant.

RAILWAYS

NEW S.M.R. RAILWAY.—Construction of a new railway has started, under the supervision of the South Manchurian Railway, along the eastern section of the Chinese Eastern Railway, between Hailin and Mutankiang. The new railway crosses the Chinese Eastern Railway line, and is to be constructed under the C.E.R. track. M. Rudy, manager of the railway, has submitted reports to the Chinese Eastern Railway, pointing out that the underground work constitutes a direct danger to the train traffic of the C.E.R. line owing to possible cave-ins. The Chinese Eastern Railway manager also emphasizes gross violation of existing rules and urges the C.E.R. Board to take urgent measures against the arbitrary acts of the S.M.R.

RAILWAY MATERIAL FROM ENGLAND. With funds assured and work resumed on the unfinished sections, prospects for the completion of the Canton-Hankow Railway appear very hopeful. The Administration declares that if the project is not complicated by political issues, through train service from Canton to Wuhan will become a reality by 1937. Regular service at this terminus is maintained as far as Shaokwan, and the Kwang-Shao (Canton-Shaokwan) section has been extended to Lokchang. The section between Shaokwan and Chuchow, the most difficult gap, remains to be completed, and will take at least four years. Owing to the numerous river and mountain barriers, a large number of bridges and tunnels have to be built. In view of the forthcoming extension of the train service, the Administration is acquiring four new locomotives and sixteen passenger coaches, which are being purchased with a loan granted by the Sino-British Boxer Fund Committee. The Administration also confirms the report that an order has been placed in Britain by the Purchasing Commission for 4,000 tons of 60-lb. rails, sufficient for fifty miles of railway, steel work for small bridges, 20 freight wagons, 20 passenger coaches, and constructional machinery.

SHIPPING

YANGTSZE TRAIN FERRY.—Mr. Han Li-wu, director of the office of the Sino-British Boxer Fund Trustees, declares that it has been decided to grant another loan of £80,000 to the Nanking Ministry of Railways for the purchase of another train ferry. He said the Changkiang, the ferry recently arrived from England, was insufficient for the Ministry's needs.

SOOCHOW CREEK DREDGING.—In view of the unnavigable state of Soochow Creek between Shanghai and Soochow due to accumulation of sand, the Ministry of Interior and Ministry of Communications have decided upon joint measures for dredging to facilitate water traffic. Funds are to be raised by a surcharge on the farm tax and contributions. For the dredging of the Soochow Creek the total cost of $2,140,000 has been decided upon, the work to be completed in six years.

FORMOSAN ENTERPRISE.—Influential Formosans plan to establish a shipping concern called the Formosa Steamship Co. The promoters seek a share of the Japan-Formosan passenger and freight service. It is reported that the company will place six ships, each of 6,000 tons, in service between Formosan ports and Kobe.

QUARANTINE STATION FOR SHANGHAI.—A new quarantine station is being erected at the mouth of the Whangpoo River. The building will have an examination department, wards, laboratory, and disinfecting department, and passengers on infected ships will be detained there for observation. The building is expected to be completed by November.

PONTOON AT SHANGHAI.—A proposal involving the construction of a double-decked pontoon at the Peking Road jetty for the exclusive use of the Shanghai City Government Ferry Services, involving the abolition of one of the lawns and the restriction of facilities for landing cargo along the Bund, has been adopted by the Shanghai Municipal Council.

NEWCHWANG PORT CONSTRUCTION. The port of Newchwang, the most important harbor for Manchoukuo, is expected to be brought under the management of the new Government. Under an agreement signed in 1914, the port and the Liao River waterways are under the control of the Liao River Construction Commission, a neutral organization, comprising the Japanese, British, American, German, French and Norwegian Consuls, the Customs and representative merchants. Expenses for improvement of the harbor so far have been met by Customs surtaxes amounting to 300,000 yuan annually. Upon retrocession of the port and waterways, the Government intends to spend a further 300,000 yuan annually on improvements.

MINING

FUSHUN SHALE OIL.—The South Manchurian Railway has succeeded in putting its shale oil interests at Fushun collieries upon an industrially sound basis and an additional expenditure of Y.6,000,000 for the current year has been approved. The S.M.R. has determined by plant expansion to produce 100,000 tons of shale oil. From this output three-quarters will go to the Japanese Navy as heavy oil and one-quarter will be manufactured into gasoline.

MANCHURIAN COAL MINES.—It is officially announced that a big coal mining corporation, styled the Manchurian Coal Mining Co., under joint Manchoukuo-Japanese management, will be organized with a capital of Y.6,000,000. The company has been granted the right to operate collieries in Mukden, Jehol and Heilungkiang provinces. Total deposits of coal are roughly estimated at over 200,000,000 tons. To unify the industry in Manchoukuo, the Fushun and Kentai collieries, now operated by the S.M.R., are expected to be transferred to the new company.

GOLD MINING IN MANCHOUKUO.—The authorities of Manchoukuo propose to introduce the strictest State control of the gold industry and have worked out a new mining code which does not permit the export of gold. A company with a capital of 15,000,000 Kuo-bi is to be established, part of the capital being Manchoukuo and the other part Japanese. The organization of this gold mining project is so far advanced that its fulfilment may be expected shortly. The reserves of gold in Manchoukuo are estimated at near 5,000,000,000 Kuo-bi, the largest gold beds being in Kirin and Heilungkiang provinces. Manual labor which has been in existence up to the present will be replaced by rational methods.